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ANTHROPOGENIC EMISSIONS DATA FOR THE 1985 NAPAP INVENTORY

Final Report

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16. ABSTRACT

The report documents the development of the anthropogenic emissions estimates to be used in the 1985 National Acid Precipitation Assessment Program (NAPAP) Emissions Inventory. Point and area source data, spanning the contiguous U.S., focus on the NAPAP high priority pollutants SO2, NOx, and VOC. Detailed point source data, provided by the states, were obtained for over 9000 plants, and area source data were obtained for more than 100 area source categories. Quality control was conducted at all levels of inventory development. This effort was the first national emissions inventory in which the data were actually returned to the responsible agencies for their comments and corrections. As a result, the quality of this annual inventory is better than that of any previously developed national inventory. Data are summarized at various levels of aggregation including nation, state, and source category. Emissions data are also analyzed by plant size, stack height, and general source type.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Sulfur Dioxide	Pollution Control	13B	07B
Emission	Nitrogen Oxides	Stationary Sources	14G	
Estimates	Organic Compounds	Anthropogenesis		07C
Human Ecology	Volatility	Acid Rain	06F	20M
Inventories		Volatile Organic Compounds (VOC)	15E	
Precipitation (Meteorology)			04B	

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ENGLISH TO METRIC CONVERSION FACTORS

1 ton = 907.1860 kilograms

1 foot = 0.3048 meters

1 gallon = 3.785 liters

1 cubic foot = 28.317 liters

1 megawatt = 1 million Joules/second
= 948.6 BTU/second

1 BTU = 1055 Joules

degrees Fahrenheit = (1.8 x °C) + 32

1 mile/hour = 1.609 kilometers/hour

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SECTION 1

EXECUTIVE SUMMARY

1.1 Background

The National Acid Precipitation Assessment Program (NAPAP) was established by Congress in 1980 (Title VII of P.L. 96-294) to coordinate and expand research on problems posed by acid deposition in and around the United States. Among the contributors to acid deposition, anthropogenic emissions sources from both the United States and Canada as well as natural sources are believed to be of primary importance. This document covers U.S. anthropogenic point and area source emissions.

A fundamental objective of NAPAP's research program is the investigation of emissions sources that may contribute to acid deposition. NAPAP's Task Group on Emissions and Controls has achieved this objective by developing historical and current inventories of acid deposition precursor emissions. The Environmental Protection Agency's Office of Research and Development has the responsibility for developing the 1985 NAPAP anthropogenic emissions inventory. Emissions inventories are necessary to assess the impact of various source types and characteristics on the emissions and abatement of acid precipitation precursors; to investigate and verify atmospheric process models that simulate source-receptor relationships; and to assess historical trends in emissions.

The objective of the 1985 NAPAP Emissions Inventory was to meet the needs of both the NAPAP acid deposition assessment and atmospheric modeling teams. These NAPAP users had three main requirements of the inventory: (1) that the data base have a consistent baseline, so that anthropogenic emissions and operating data reflect as accurately as possible a single and consistent year, (2) that the data base be complete and that the data be of the highest possible quality, and (3) that any problems or errors found in the data be accurately tracked with an Audit Trail. In order to meet these objectives, it was imperative that cooperation be established between the U.S. EPA, Environment Canada, and the State air pollution control agencies. During the development of the 1985 NAPAP Emissions Inventory, budgetary and scheduling constraints resulted in a need to develop priorities in the inventory effort to ensure that the information of most importance to NAPAP would be obtained and that the NAPAP objectives would be met.

1.2 Methodology

The U.S. anthropogenic emissions inventory is divided into two major categories, point and area sources. Point sources have precise location data and emit at least 100 tons per year (TPY) of a criteria pollutant (NO_x, SO_2, TSP, VOC, or CO). Area sources comprise both mobile sources and point sources too small and too numerous to list individually. Point source data are supplied to EPA by the State agencies in an essentially bottom-up collection strategy. The area source emissions estimates are calculated by EPA using a series of computer programs. This is primarily a top-down strategy which allocates national emissions estimates to the State and county levels.

The data collection efforts for 1985 point source data were prioritized to reflect the needs of the NAPAP research and assessment programs. Estimates of SO_2, NO_x, and VOC emissions were given the highest priority. In addition, the effort concentrated on facilities emitting at least 1000 TPY because they represent 97, 90, and 61 percent of the point source SO_2, NO_x, and VOC emissions, respectively. Of the 50 data elements in a NEDS record, the data collection effort focused on the 14 items that are most important for the NAPAP community. These priority items include the annual emissions estimates for SO_2, NO_x and VOC; the maximum design and annual operating rates; the Source and Standard Industrial Classification codes (SCC and SIC); emissions control equipment and efficiencies; fuel characteristics; stack parameters; location data; and operating schedules. The final 1985 NAPAP Emissions Inventory will contain estimates of emissions of five criteria pollutants, SO_2, NO_x, VOC, CO, and TSP, and four other chemical species believed to play an important role in acid deposition. These four other species are primary sulfate, hydrogen chloride, hydrogen fluoride, and ammonia.

Meeting the objectives of the NAPAP program required the cooperation of many different agencies and organizations including the NAPAP task groups, the State and Territorial Air Pollution Program Administrators (STAPPA), the U.S.

State and Territorial Air Pollution Program Administration (STAPPA), the U.S. and Regional EPA offices, and the State air pollution control offices. STAPPA began the collection effort with a survey to determine the capabilities and needs of the State agencies to meet the objectives of the 1985 NAPAP Emissions Inventory. Over the course of the study, EPA offered financial and technical assistance to States in the development of their inventories. Workshops and seminars were provided to acquaint State personnel with the priorities and objectives of the NAPAP Emissions Inventory. In addition, Contractor assistance was made available to collect, encode, and execute quality control programs on the State point source data.

1.3 Quality Control

Quality control (QC) procedures consisting of manual and computerized checking procedures were specifically designed for the 1985 NAPAP Emissions Inventory. These procedures were designed to ensure that the quality of the data met the requirements of the NAPAP community as closely as possible, given the resource constraints of the inventory effort.

QC was conducted at all levels of the inventory development. A computerized edit checking program (NE061) was made available to the States, Regional offices, and Contractors to help identify problems in the data while the data were still in the hands of the people most knowledgeable about the sources. As the data were entered into the NEDS, more checks were employed to ensure that the data were within reasonable limits and were internally consistent. For each State, a report was developed discussing possible problems with the data submission and was returned to the State and Regional offices to afford the people most knowledgeable about the data a chance to correct errors and comment on the QC findings. The States returned the QC reports with comments and corrected data. This effort was the first national emissions inventory in which the data were actually returned to the responsible agencies for their comments and corrections. As a result, the quality of this annual inventory is better than that of any previously developed national inventory.

1.4 Summaries and Analyses of the 1985 NAPAP Emissions Inventory

The following tables and figures summarize current emissions data in the 1985 NAPAP Emissions Inventory. Table 1-1 gives a State-level profile of the number of plants, points, and different processes (SCC occurrences). Table 1-2 presents an emissions summary for the three primary pollutants of concern, broken down into point and area sources by source category. Table 1-3 aggregates these categories into six major categories. These tables clearly show that over 90 percent of the sulfur dioxide emissions are from point sources and that approximately 70 percent of the total sulfur dioxide emissions are from electric utilities. Nitrogen oxide emissions are split between point and area sources. The electric utilities represent approximately 30 percent of the total NO_x emissions or 70 percent of the point source NO_x, while mobile sources account for 43 percent of the total NO_x or 80 percent of the area source NO_x. VOC emissions are dominated by area source categories, with mobile sources representing 33 percent of the total or 37 percent of the area source VOC emissions. Solvent evaporation loss is the second largest source, representing 21 percent of the total or 23 percent of the area source VOC emissions.

The relative importance of point versus area sources for the three pollutants is illustrated Figure 1-1. SO_2 emissions are dominated by point sources, NO_x emissions are almost evenly split between point and area sources, and VOC emissions are dominated by area sources. Figure 1-2 shows that for point sources, combustion by electric utilities dominates the SO_2 and NO_x emissions. Figure 1-3 shows that mobile souces dominate NO_x emissions while mobile sources and solvent evaporation loss (industrial processes) dominate VOC emissions. Figures 1-4 through 1-6 reillustrate this information by pollutant using pie charts.

Tables 1-4 through 1-6 break down the primary pollutants by State. The first table lists total emissions nationwide by State. The second and third tables illustrate point and area source emissions by State.

Table 1-7 and Figure 1-7 both demonstrate the distribution of point source emissions by plant size. For SO_2, 81 percent of emissions are from facilities emitting at least 10,000 tons per year. These facilities are primarily

TABLE 1-1. 1985 STATIONARY POINT SOURCE PROFILE (NEDS)

STATE	PLANTS	POINTS	POINT-SCC
Alabama	171	1,100	1,371
Arizona	67	223	311
Arkansas	118	754	804
California	651	8,399	12,599
Colorado	97	380	442
Connecticut	55	572	722
Delaware	38	217	275
Dist. of Col.	13	53	121
Florida	127	1,107	1,654
Georgia	184	1,592	2,321
Idaho	23	84	85
Illinois	520	8,703	8,707
Indiana	366	2,211	3,818
Iowa	64	2,622	3,039
Kansas	153	998	1,699
Kentucky	224	627	943
Louisiana	315	7,808	8,976
Maine	59	245	283
Maryland	124	1,323	1,777
Massachusetts	186	2,269	3,440
Michigan	296	3,431	4,114
Minnesota	217	2,817	4,975
Mississippi	130	282	468
Missouri	259	2,466	3,212
Montana	28	385	485
Nebraska	41	153	175
Nevada	22	126	188
New Hampshire	31	194	259
New Jersey	191	2,961	2,971
New Mexico	183	899	900
New York	383	1,469	2,125
North Carolina	348	2,543	3,078
North Dakota	44	111	121
Ohio	430	2,726	3,544
Oklahoma	212	1,967	2,504
Oregon	51	110	151
Pennsylvania	552	3,024	3,987
Rhode Island	24	105	176
South Carolina	126	517	704
South Dakota	18	30	71
Tennessee	298	4,565	5,696
Texas	859	27,657	31,426
Utah	64	213	355
Vermont	17	104	117
Virginia	260	1,706	2,749
Washington	181	1,008	1,520
West Virginia	184	6,555	6,767
Wisconsin	224	1,760	2,649
Wyoming	108	482	577
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TOTAL	9,336	111,653	139,451

TABLE 1-2. 1985 U.S. EMISSIONS BY CATEGORY FOR SO_2, NO_x, AND VOC (10^3 TONS)

	AREA			POINT		
EMISSION CATEGORIES	SO_2	NO_x	VOC	SO_2	NO_x	VOC
FUEL COMBUSTION	1,070.4	2,022.2	2,433.7	18,132.9	8,570.4	219.7
External Combustion	1,070.4	2,022.2	2,433.7	18,086.6	7,833.9	136.8
Residential	178.2	407.1	2,395.3	0.0	0.0	0.0
Anthracite Coal	7.7	0.8	2.8	0.0	0.0	0.0
Bituminous Coal	29.5	2.1	7.5	0.0	0.0	0.0
Distillate Oil	128.2	75.0	2.9	0.0	0.0	0.0
Residual Oil	0.5	0.1	0.0	0.0	0.0	0.0
Natural Gas	1.2	248.3	13.4	0.0	0.0	0.0
Wood	11.0	80.7	2,368.8	0.0	0.0	0.0
Electric Generation	0.0	0.0	0.0	16,166.9	6,701.1	54.0
Anthracite Coal	0.0	0.0	0.0	22.4	14.8	0.3
Bituminous Coal	0.0	0.0	0.0	14,835.3	5,602.6	35.1
Lignite	0.0	0.0	0.0	627.8	394.7	6.2
Residual Oil	0.0	0.0	0.0	597.5	187.2	2.8
Distillate Oil	0.0	0.0	0.0	56.0	33.9	0.5
Natural Gas	0.0	0.0	0.0	6.5	448.3	7.0
Process Gas	0.0	0.0	0.0	0.2	11.5	0.1
Other	0.0	0.0	0.0	21.3	8.1	2.1
Industrial	662.4	1,404.1	30.9	1,750.3	1,061.2	79.8
Anthracite Coal	0.1	0.1	0.0	11.1	2.9	0.0
Bituminous Coal	353.3	130.5	0.6	1,080.8	384.2	4.3
Lignite	0.0	0.0	0.0	48.5	9.5	0.2
Residual Oil	236.0	46.5	0.2	396.9	138.6	4.3
Distillate Oil	54.7	49.8	1.6	19.5	23.3	0.7
Natural Gas	0.7	1,176.9	28.3	38.9	296.5	8.5
Process Gas	0.1	0.1	0.0	105.4	92.8	3.8
Coke	0.2	0.0	0.0	11.9	6.8	0.1
Wood	17.3	0.3	0.2	15.1	84.1	49.8
LPG	0.0	0.0	0.0	0.0	0.7	0.0
Bagasse	0.0	0.0	0.0	0.2	1.7	2.6
Other	0.0	0.0	0.0	22.0	20.2	5.3
Commercial/Institution	229.9	211.1	7.5	169.4	71.6	3.0
Anthracite Coal	15.5	5.5	0.0	3.4	1.2	0.1
Bituminous Coal	24.5	6.4	0.2	114.6	23.4	0.7
Lignite	0.0	0.0	0.0	1.0	0.5	0.2
Residual Oil	103.6	31.4	0.6	43.4	16.4	0.5
Distillate Oil	85.7	51.9	0.7	5.7	3.0	0.1
Natural Gas	0.5	115.9	6.0	0.7	22.1	0.3
Wood	0.0	0.0	0.0	0.1	2.8	0.5
LPG	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.5	2.3	0.6

TABLE 1-2. (continued)

	AREA			POINT		
EMISSION CATEGORIES	SO_2	NO_x	VOC	SO_2	NO_x	VOC
Internal Combustion	0.0	0.0	0.0	46.2	736.6	82.9
Electric Generation	0.0	0.0	0.0	11.0	68.5	2.9
Distillate Oil	0.0	0.0	0.0	10.0	15.4	0.6
Natural Gas	0.0	0.0	0.0	1.1	53.1	2.3
Industrial	0.0	0.0	0.0	32.9	644.5	73.2
Distillate Oil	0.0	0.0	0.0	0.4	5.4	0.4
Natural Gas	0.0	0.0	0.0	31.0	633.9	71.8
Gasoline	0.0	0.0	0.0	0.0	0.1	0.2
Diesel Fuel	0.0	0.0	0.0	0.1	2.0	0.1
Other	0.0	0.0	0.0	1.3	3.1	0.7
Commercial/Institution	0.0	0.0	0.0	1.9	17.8	3.3
Engine Testing	0.0	0.0	0.0	0.4	5.7	3.5
INDUSTRIAL PROCESS	0.0	0.0	0.0	2,906.9	923.0	2,138.2
Chemical Manufacturing	0.0	0.0	0.0	501.6	171.7	518.3
Food/Agriculture	0.0	0.0	0.0	3.4	4.8	50.5
Primary Metals	0.0	0.0	0.0	976.2	54.2	55.6
Secondary Metals	0.0	0.0	0.0	50.1	20.6	18.4
Mineral Products	0.0	0.0	0.0	289.3	240.8	17.3
Petroleum Industry	0.0	0.0	0.0	788.5	288.5	231.3
Wood Products	0.0	0.0	0.0	130.6	73.5	45.6
Organic Solvent Evap	0.0	0.0	0.0	0.9	8.3	825.2
Petroleum Storage/Trans.	0.0	0.0	0.0	1.5	1.2	290.8
Metal/Fabrication	0.0	0.0	0.0	0.3	1.9	3.3
Textile Manufacturing	0.0	0.0	0.0	0.0	0.1	8.6
Other/Not Classified	0.0	0.0	0.0	164.6	57.2	73.2
SOLID WASTE DISPOSAL	14.6	69.2	608.8	20.1	18.3	11.1
Government	0.0	0.0	0.0	5.7	7.8	5.9
Municipal Incineration	0.0	0.0	0.0	5.6	6.4	5.2
Open Burning	0.0	0.0	0.0	0.0	0.4	0.0
Other Incineration	0.0	0.0	0.0	0.1	0.9	0.7
Residential	9.6	60.3	590.7	0.0	0.0	0.0
On-site Incineration	1.4	3.0	288.5	0.0	0.0	0.0
Open Burning	8.3	57.3	302.2	0.0	0.0	0.0
Commercial/Institutional	4.6	7.1	9.8	3.6	5.5	1.0
On-site Incineration	4.6	6.9	8.4	3.6	5.5	1.0
Open Burning	0.0	0.2	1.4	0.0	0.0	0.0
Industrial	0.4	1.7	8.4	10.7	5.0	4.2
On-site Incineration	0.3	0.3	2.6	10.7	4.9	4.1
Open Burning	0.1	1.4	5.8	0.0	0.1	0.1

TABLE 1-2. (continued)

		AREA			POINT	
EMISSION CATEGORIES	SO_2	NO_x	VOC	SO_2	NO_x	VOC
TRANSPORTATION	863.6	8,834.4	7,287.7	0.0	0.0	0.0
Land Vehicles	690.9	8,549.2	6,667.5	0.0	0.0	0.0
Gasoline	274.4	5,139.4	6,102.9	0.0	0.0	0.0
Light Duty Vehicles	185.2	3,368.3	3,643.7	0.0	0.0	0.0
Light Duty Trucks	69.0	1,320.3	1,538.1	0.0	0.0	0.0
Heavy Duty Vehicles	14.1	297.2	425.1	0.0	0.0	0.0
Off-Highway	6.2	153.5	496.0	0.0	0.0	0.0
Diesel Fuel	416.5	3,409.8	564.6	0.0	0.0	0.0
Heavy Duty Vehicles	242.9	1,825.2	259.7	0.0	0.0	0.0
Off-Highway	82.6	994.2	161.6	0.0	0.0	0.0
Rail	91.0	590.4	143.3	0.0	0.0	0.0
Aircraft	14.1	125.6	173.2	0.0	0.0	0.0
Military	4.8	37.4	87.1	0.0	0.0	0.0
Civil	1.0	10.5	29.6	0.0	0.0	0.0
Commercial	8.3	77.8	56.6	0.0	0.0	0.0
Vessels	158.5	159.6	447.0	0.0	0.0	0.0
Bituminous Coal	3.6	0.2	0.6	0.0	0.0	0.0
Diesel	15.8	118.2	29.6	0.0	0.0	0.0
Residual Oil	135.8	22.3	1.3	0.0	0.0	0.0
Gasoline	3.3	18.9	415.5	0.0	0.0	0.0
MISCELLANEOUS AREA	4.2	129.4	6,184.2	0.0	0.0	0.0
Forest Fires	1.2	33.6	161.5	0.0	0.0	0.0
Forest Managed Burning	3.0	82.0	293.1	0.0	0.0	0.0
Agricultural Burning	0.0	8.4	55.0	0.0	0.0	0.0
Structural Fires	0.0	5.4	44.4	0.0	0.0	0.0
Gasoline Stn. Evap. Loss	0.0	0.0	999.0	0.0	0.0	0.0
Solvent Evap. Loss	0.0	0.0	4,631.3	0.0	0.0	0.0
ADDITIONAL AREA	0.0	0.0	3,385.8	0.0	0.0	0.0
POTWs	0.0	0.0	25.4	0.0	0.0	0.0
Cutback A	0.0	0.0	191.9	0.0	0.0	0.0
SOCMI Fugitives	0.0	0.0	164.5	0.0	0.0	0.0
Bulk Terminals/Plants	0.0	0.0	398.0	0.0	0.0	0.0
Refinery Fugitives	0.0	0.0	762.4	0.0	0.0	0.0
Bakeries	0.0	0.0	50.0	0.0	0.0	0.0
Pharmaceutical Mfg	0.0	0.0	33.6	0.0	0.0	0.0
Synthetic Fiber Mfg	0.0	0.0	160.9	0.0	0.0	0.0
Oil/Natural Gas Fields	0.0	0.0	194.0	0.0	0.0	0.0
TSDFs	0.0	0.0	1,405.1	0.0	0.0	0.0
GRAND TOTAL	1,952.9	11,055.3	19,900.3	21,059.8	9,511.6	2,369.0

Based on the 48 contiguous States and the District of Columbia

TABLE 1-3. 1985 U.S. ANTHROPOGENIC EMISSIONS (MAJOR CATEGORIES)

CATEGORY	TYPE		EMISSIONS (10^3 TONS) SO_2	NO_x	VOC
Utility Combustion (UC)	Point		16,177.9	6,769.6	56.9
Industrial Combustion (IC)	Area		662.4	1,404.1	30.9
	Point		1,783.2	1,705.7	153.0
		Subtotal	2,445.6	3,109.8	183.9
Other Combustion (OC)	Area		408.1	618.2	2,402.8
	Point		171.7	95.1	9.8
		Subtotal	579.8	713.2	2,412.6
Industrial Process (IP)	Area*		0.0	0.0	6,200.7
	Point		2,906.9	923.0	2,138.2
		Subtotal	2,906.9	923.0	8,338.9
Transportation (TRAN)	Area		863.6	8,834.4	7,287.7
Other (OTH)	Area		18.9	198.6	3,978.2
	Point		20.1	18.3	11.1
		Subtotal	38.9	216.8	3,989.3
GRAND TOTAL			23,012.7	20,566.9	22,269.3

* For this analysis, certain area source emissions contained within the the Miscellaneous and Additional Area Sources have been compared to the Industrial Process point sources; these area sources include solvent evaporation loss, synthetic organic chemical manufacturing, bulk plants, refinery fugitives, bakeries, pharmaceutical manufacturing, and synthetic fiber manufacturing.

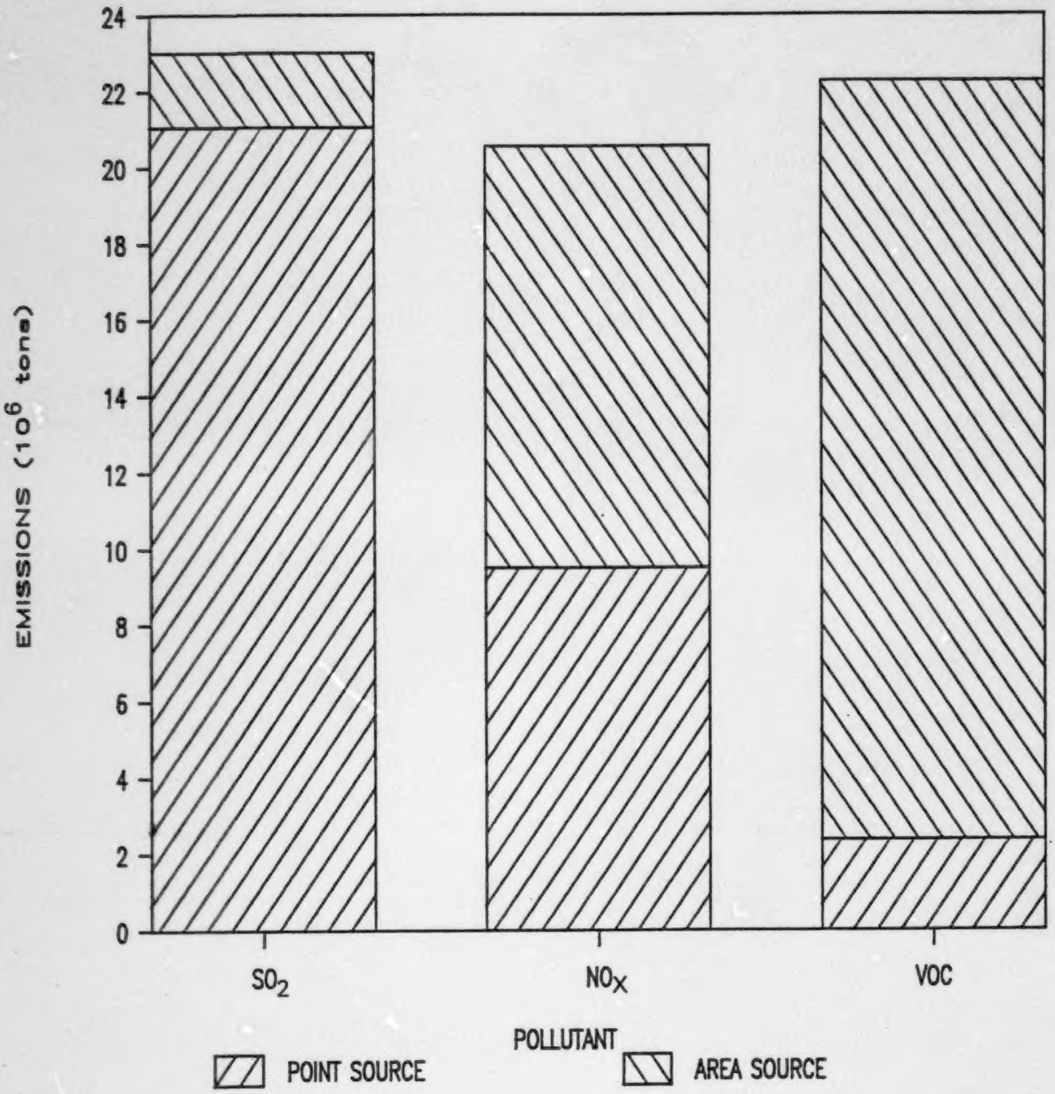
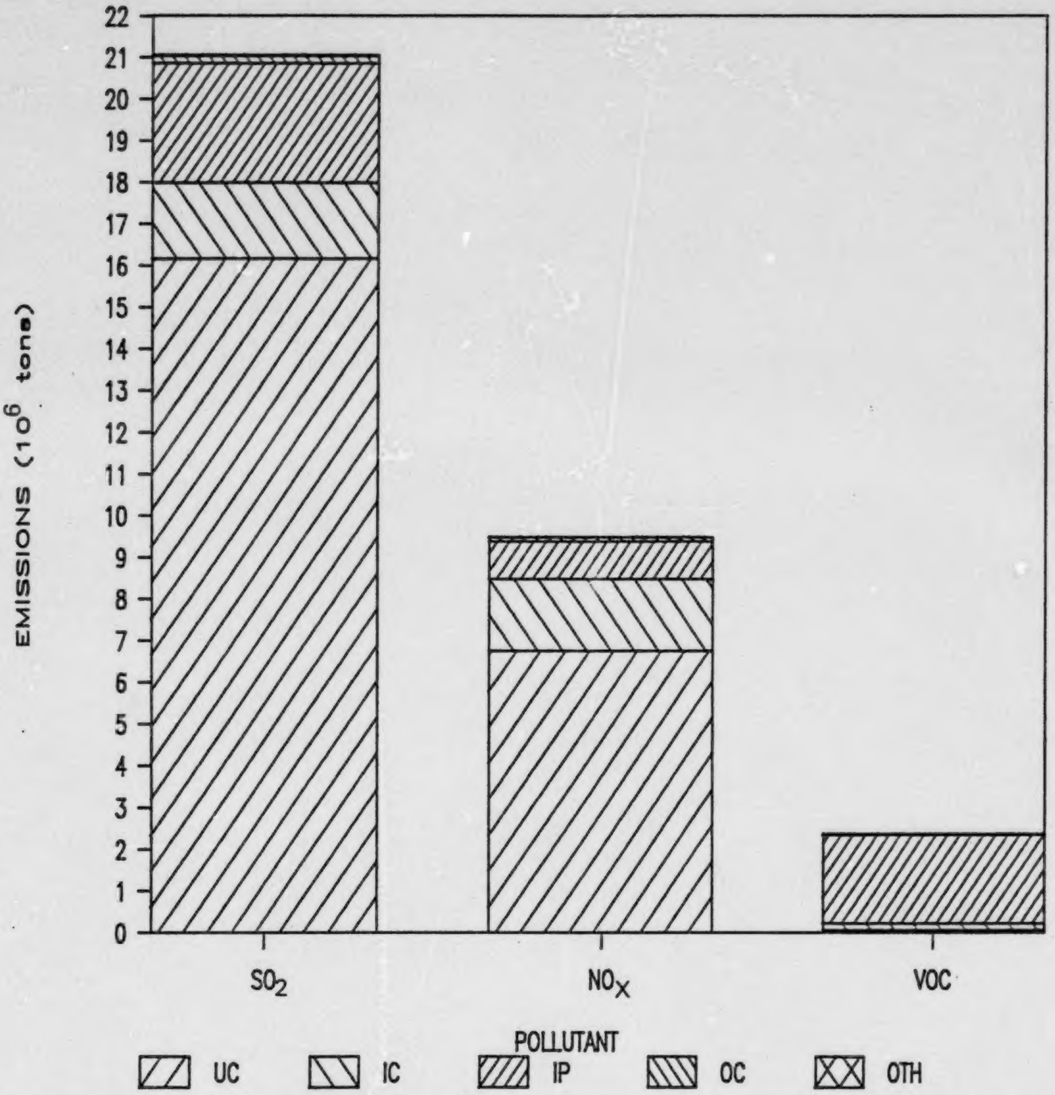
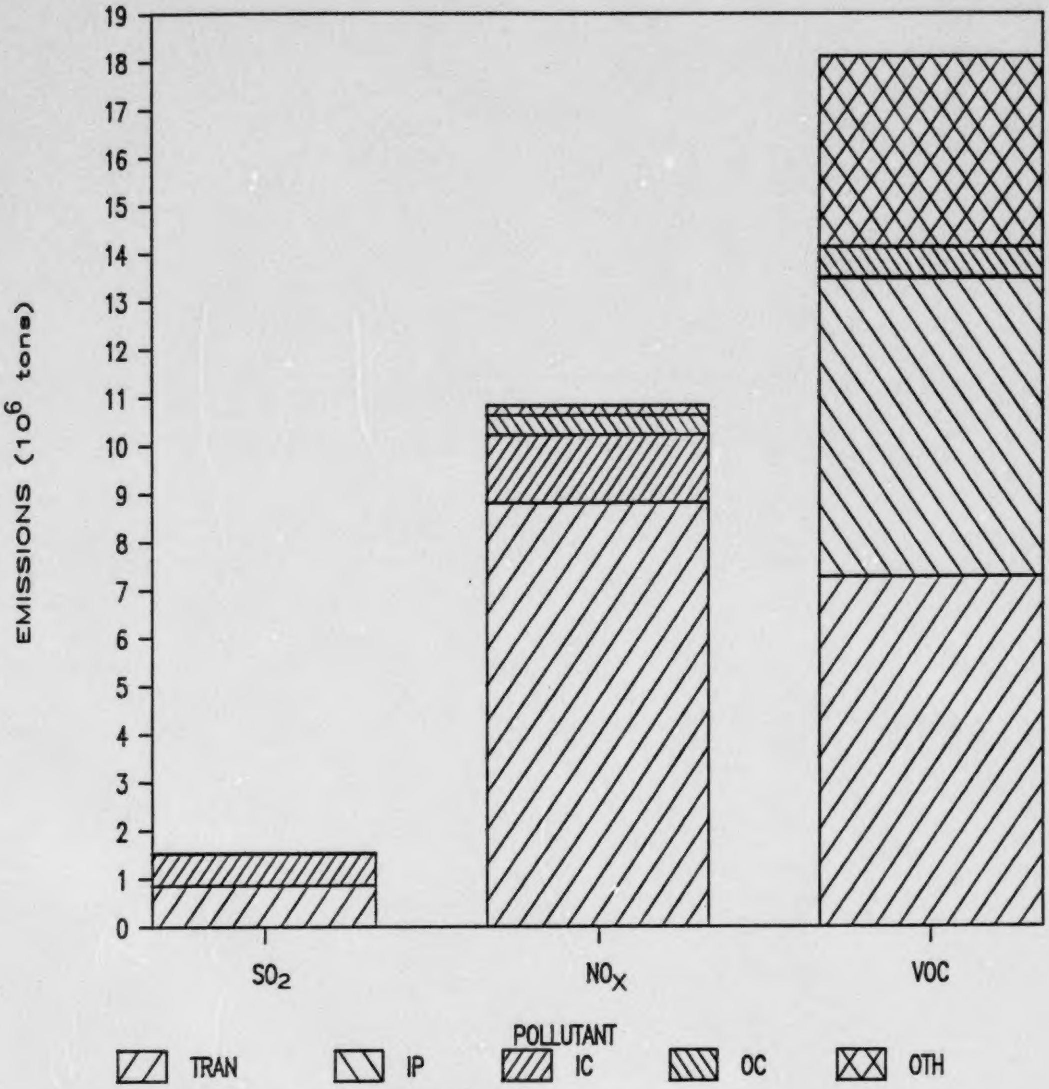


Figure 1-1. Comparison of point and area source SO_2, NO_x, and VOC emissions.



UC = Utility Combustion
IC = Industrial Combustion
IP = Industrial Processes
OC = Other Combustion
OTH = Other Sources

Figure 1-2. U.S. anthropogenic point source emissions.



Tran = Transportation
IP = Industrial Processes*
IC = Internal Combustion
OC = Other Combustion
OTH = Other Sources

* For this analysis, some Miscellaneous and Additional area source categories as listed in Table 1-3 have been included under Industrial Processes; this is not a NEDS area source category.

Figure 1-3. U.S. anthropogenic area source emissions.

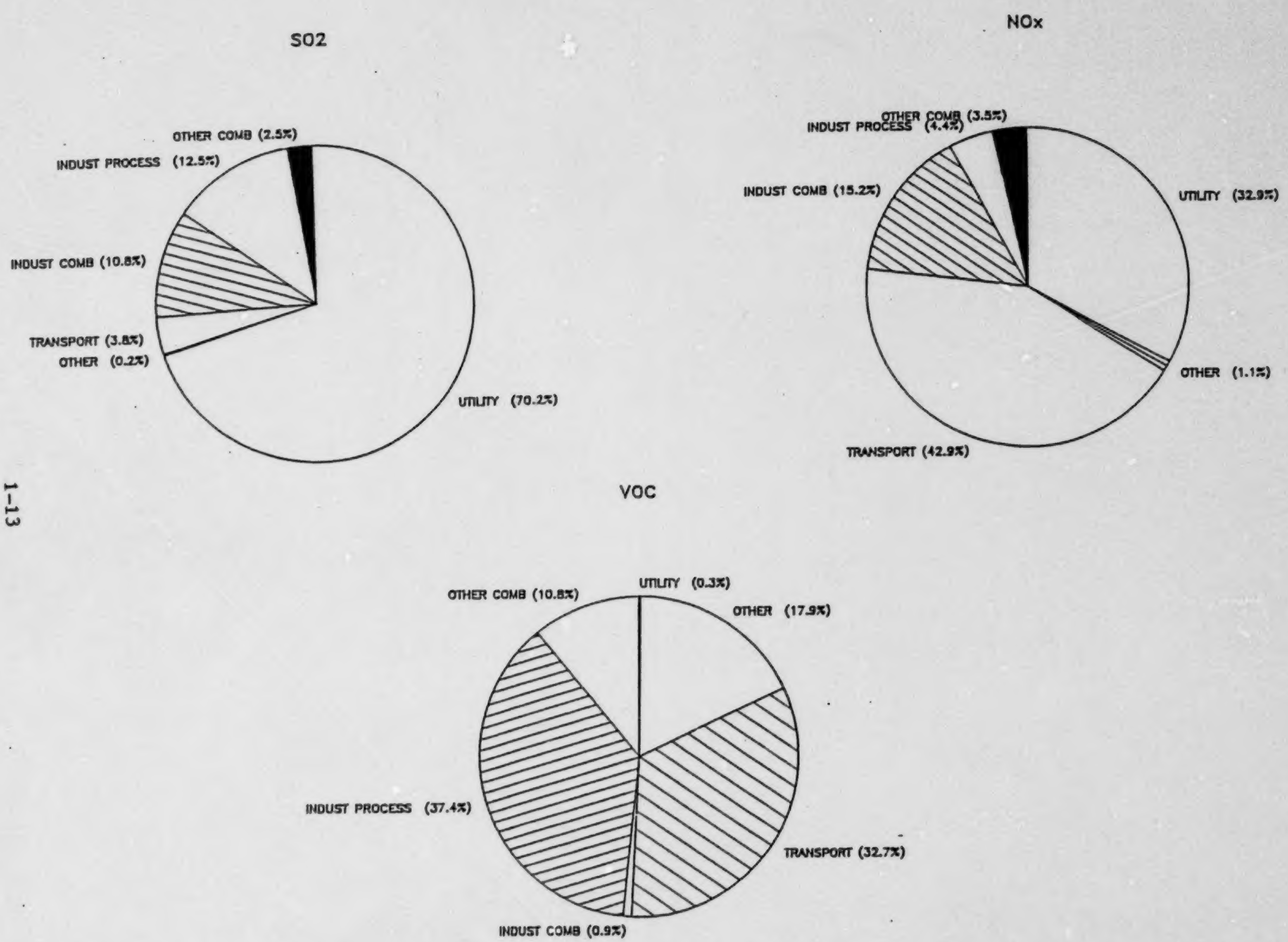


Figure 1-4. Distribution of 1985 SO_2, NO_x, and VOC emissions by major category.

TABLE 1-4. 1985 TOTAL SO_2, NO_x, AND VOC EMISSIONS (10^3 TONS)

STATE	SO_2	NO_x	VOC
Alabama	720.6	469.3	510.4
Arizona	699.4	245.5	225.3
Arkansas	109.5	238.0	223.6
California	225.2	1,244.6	2,111.7
Colorado	91.4	291.8	294.2
Connecticut	87.3	127.9	232.9
Delaware	117.6	68.5	68.3
Dist. of Col.	7.4	20.4	28.2
Florida	664.1	681.8	737.3
Georgia	1,111.5	590.7	587.6
Idaho	36.8	87.8	187.9
Illinois	1,397.8	971.6	957.1
Indiana	1,864.2	880.7	573.7
Iowa	289.7	265.2	205.5
Kansas	160.5	443.3	244.2
Kentucky	879.4	520.5	425.8
Louisiana	402.3	763.4	646.1
Maine	79.2	66.8	171.1
Maryland	307.4	281.7	257.4
Massachusetts	328.3	277.0	418.7
Michigan	550.6	658.4	789.0
Minnesota	174.8	355.9	430.6
Mississippi	174.6	238.8	275.1
Missouri	1,163.8	536.2	507.8
Montana	91.1	155.4	166.3
Nebraska	65.3	165.3	120.5
Nevada	40.3	112.7	76.2
New Hampshire	85.3	54.6	85.4
New Jersey	183.4	369.0	585.6
New Mexico	271.4	284.8	171.7
New York	665.1	626.3	987.7
North Carolina	484.8	501.1	678.7
North Dakota	221.3	183.2	60.8
Ohio	2,560.8	1,018.8	1,025.9
Oklahoma	150.1	396.4	357.8
Oregon	44.6	170.5	324.5
Pennsylvania	1,425.0	958.0	925.1
Rhode Island	9.2	30.3	67.3
South Carolina	236.8	259.1	355.7
South Dakota	43.2	72.7	84.0
Tennessee	977.3	511.4	554.9
Texas	1,476.3	2,477.6	2,324.1
Utah	71.8	170.7	165.1
Vermont	7.3	25.2	52.5
Virginia	311.5	390.1	577.9
Washington	168.5	274.9	479.5
West Virginia	1,058.4	461.4	410.7
Wisconsin	514.4	348.9	431.9
Wyoming	205.8	222.4	90.3
TOTAL	23,012.7	20,566.9	22,269.3

TABLE 1-5. 1985 POINT SOURCE SO_2, NO_x, AND VOC EMISSIONS (10^3 TONS)

STATE	SO_2	NO_x	VOC
Alabama	687.1	264.2	74.3
Arizona	674.6	75.4	3.7
Arkansas	83.3	71.0	22.8
California	81.2	230.8	97.1
Colorado	76.3	133.0	6.1
Connecticut	71.2	29.3	4.4
Delaware	113.8	42.0	7.8
Dist. of Col.	3.7	1.7	0.6
Florida	613.5	290.6	17.0
Georgia	1,084.5	292.5	35.8
Idaho	24.3	6.4	1.1
Illinois	1,361.6	565.4	163.9
Indiana	1,703.7	571.1	95.1
Iowa	272.0	99.2	7.3
Kansas	144.8	240.3	32.5
Kentucky	827.3	288.9	58.2
Louisiana	260.2	432.3	128.6
Maine	67.1	19.4	6.0
Maryland	254.0	95.8	13.9
Massachusetts	281.5	98.4	37.5
Michigan	519.2	318.5	94.4
Minnesota	154.7	154.5	49.3
Mississippi	158.9	74.5	36.2
Missouri	1,112.3	292.5	84.3
Montana	77.8	39.8	7.6
Nebraska	53.2	40.2	4.1
Nevada	34.3	62.5	0.6
New Hampshire	80.4	24.0	4.3
New Jersey	132.9	114.1	42.0
New Mexico	249.6	184.2	21.5
New York	571.3	183.5	53.2
North Carolina	436.0	233.9	74.1
North Dakota	200.4	115.9	2.9
Ohio	2,460.8	577.1	95.0
Oklahoma	118.4	155.1	31.8
Oregon	12.2	10.9	12.7
Pennsylvania	1,358.1	550.1	75.6
Rhode Island	4.0	2.7	6.0
South Carolina	219.6	118.1	25.9
South Dakota	36.5	17.1	5.6
Tennessee	945.6	277.6	96.9
Texas	1,255.0	1,163.4	450.4
Utah	53.1	86.8	16.1
Vermont	2.6	1.9	1.8
Virginia	262.8	139.0	86.6
Washington	137.4	73.3	29.6
West Virginia	1,049.5	381.7	78.9
Wisconsin	493.0	149.5	49.9
Wyoming	184.6	121.2	17.8
TOTAL	21,059.8	9,511.6	2,369.0

TABLE 1-6. 1985 AREA SOURCE SO_2, NO_x, AND VOC EMISSIONS (10^3 TONS)

STATE	SO_2	NO_x	VOC
Alabama	33.5	205.1	436.0
Arizona	24.9	170.0	221.6
Arkansas	26.2	167.0	200.8
California*	144.0	1,013.8	2,014.6
Colorado	15.1	158.8	288.1
Connecticut	16.1	98.6	228.4
Delaware	3.8	26.5	60.5
Dist. of Col.	3.6	18.8	27.5
Florida	50.6	391.2	720.3
Georgia	27.1	298.2	551.8
Idaho	12.5	81.3	186.9
Illinois	36.2	406.2	793.1
Indiana	160.5	309.6	478.6
Iowa	17.6	165.9	198.2
Kansas	15.7	203.0	211.7
Kentucky	52.2	231.5	367.6
Louisiana	142.1	331.1	517.4
Maine	12.1	47.4	165.1
Maryland	53.4	185.9	243.6
Massachusetts	46.9	178.6	381.2
Michigan	31.4	339.8	694.5
Minnesota	20.1	201.4	381.3
Mississippi	15.7	164.3	238.9
Missouri	51.5	243.8	423.5
Montana	13.3	115.6	158.7
Nebraska	12.0	125.1	116.4
Nevada	6.0	50.2	75.7
New Hampshire	4.9	30.6	81.0
New Jersey	50.5	254.9	543.6
New Mexico	21.8	100.7	150.2
New York	93.8	442.8	934.5
North Carolina	48.7	267.2	604.5
North Dakota	20.9	67.3	57.9
Ohio	100.0	441.8	930.9
Oklahoma	31.8	241.3	326.0
Oregon	32.4	159.7	311.8
Pennsylvania	66.9	407.9	849.4
Rhode Island	5.2	27.7	61.3
South Carolina	17.2	140.9	329.8
South Dakota	6.7	55.6	78.4
Tennessee	31.7	233.8	457.9
Texas	221.2	1,314.1	1,873.8
Utah	18.7	83.9	149.0
Vermont	4.8	23.3	50.7
Virginia	48.7	251.2	491.2
Washington	31.1	201.6	449.9
West Virginia	8.9	79.7	331.9
Wisconsin	21.4	199.4	381.9
Wyoming	21.2	101.1	72.5
TOTAL	1,952.9	11,055.3	19,900.3

* California maintains an extensive area source inventory that is not compatible with the NEDS. California area source totals from their State system are 87 x 10^3 TPY SO_2, 826 x 10^3 TPY NO_x, and 1,154 x 10^3 TPY VOC.

Table 1-7 and Figure 1-5 both demonstrate the distribution of point source emissions by plant size. For SO_2, 81 percent of emissions are from facilities emitting at least 10,000 tons per year. These facilities are primarily utilities and smelters. For NO_x, only 60 percent of emissions are from facilities emitting at least 10,000 tons per year. Again, these facilities are primarily utilities and large industrial sources. For VOCs, the distribution according to source size is far more uniform, reflecting the finding that VOC point source emissions originate in a wide variety of industrial processes.

Table 1-8 presents the relationship between point source emissions and stack height. Utility emissions of SO_2 and NO_x predominate the point source category; these boilers are typically associated with large stacks. Most point source VOC emissions, however, are contributed by industrial processes which typically vent emissions near ground level.

As is seen in Table 1-9, the 1985 NEDS inventory was largely successful in achieving its goal of a consistent baseline year. With few exceptions, the data represent 1985 emissions estimates and 1985 operating data. The second major objective was to compile a complete inventory of the data items that are most important to the NAPAP community. Table 1-10 illustrates that while some data elements are still missing in the 1985 NAPAP Emissions Inventory, the coverage of the data is excellent for large sources. These remaining missing items represent three categories: data intentionally left blank by the States, data not applicable to a particular source, or data which were not available. The first case includes emissions estimates which are designated by the States to be calculated by the NEDS software using State-supplied throughputs and standard emission factors. Inapplicable data include items such as blank stack heights for ground level sources (e.g., fugitives). As explained in Section 4, these data have been reviewed using computerized and manual checks at the State, Regional, and National levels. Large sources of SO_2, NO_x, and VOC have received the most scrutiny and most remaining missing items represent the first and second categories of missing data. However, several data elements, such as operating rate and maximum design rate, were specifically excluded from some States' requirements due to confidentiality restrictions, or because the existing State inventories lacked mechanisms to include the data.

TABLE 1-7. DISTRIBUTION OF EMISSIONS BY PLANT EMISSIONS SIZE CLASSES

POLLUTANT	RANGE (TONS)	NUMBER OF PLANTS	EMISSIONS (10^3 TONS)	PERCENT OF EMISSIONS
SO_2	>10,000	357	17,116	81%
	5,000 - 10,000	216	1,548	7%
	2,500 - 5,000	264	932	5%
	1,000 - 2,500	457	746	4%
	500 - 1,000	449	316	1%
	100 - 500	1,522	359	2%
	1 - 100	4,836	43	0%
			------	-----
			21,060	100%
NO_x	>10,000	224	5,632	60%
	5,000 - 10,000	173	1,174	12%
	2,500 - 5,000	248	873	9%
	1,000 - 2,500	549	867	9%
	500 - 1,000	564	403	4%
	100 - 500	2,026	473	5%
	1 - 100	4,317	90	1%
			------	-----
			9,512	100%
VOC	>10,000	17	231	11%
	5,000 - 10,000	44	299	13%
	2,500 - 5,000	120	416	17%
	1,000 - 2,500	317	492	21%
	500 - 1,000	473	327	13%
	100 - 500	2,355	518	21%
	1 - 100	4,775	86	4%
			------	-----
			2,369	100%

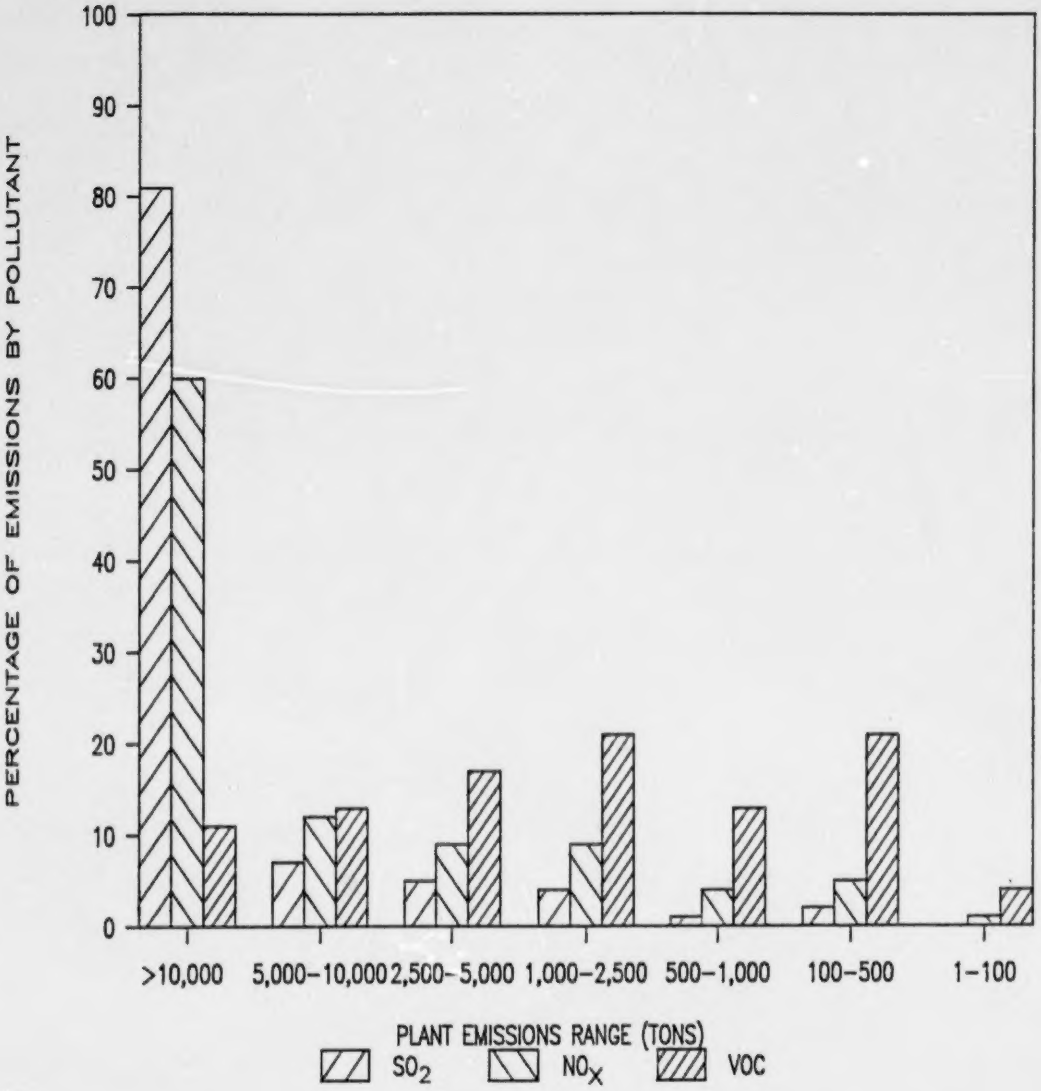


Figure 1-5. Distribution of emissions by plant emissions magnitude classes.

TABLE 1-8. SUMMARY OF 1985 SO_2, NO_x, AND VOC POINT SOURCE EMISSIONS BY STACK HEIGHT CATEGORIES (U.S. TOTAL)

STACK HEIGHT RANGE (Feet)	PERCENTAGE OF EMISSIONS		
	SO_2	NO_x	VOC
0 - 120	7.3	19.1	88.0
121 - 240	12.8	14.6	8.5
241-480	24.2	22.7	2.3
>480	55.7	43.6	1.2
EMISSIONS* (10^3 Tons)	20,974	9,474	2,374

* Do not equal total point source emissions because some point sources do not have stacks (e.g., process fugitive emissions)

TABLE 1-9. PERCENT EMISSIONS BY YEAR OF EMISSIONS (1000 TPY PLANTS)

	--- SO_2 ---		NO_x	--- VOC ---	
STATE	1985	1982	1985	1985	1984
Alabama	100%		100%	100%	
Arizona	100%		100%	100%	
Arkansas	100%		100%	100%	
California	100%		100%	100%	
Colorado	100%		100%	100%	
Connecticut	100%		100%	100%	
Delaware	100%		100%	100%	
Dist. of Col.	100%		100%	100%	
Florida	98%	2%	100%	100%	
Georgia	100%		100%	100%	
Idaho	100%		100%	100%	
Illinois	100%		100%	100%	
Indiana	100%		100%	100%	
Iowa	100%		100%	100%	
Kansas	100%		100%	100%	
Kentucky	100%		100%	100%	
Louisiana	100%		100%	100%	
Maine	100%		100%	100%	
Maryland	100%		100%	100%	
Massachusetts	100%		100%	100%	
Michigan	100%		100%	100%	
Minnesota	100%		100%	100%	
Mississippi	100%		100%	100%	
Missouri	100%		100%	100%	
Montana	100%		100%	100%	
Nebraska	100%		100%	100%	
Nevada	100%		100%	100%	
New Hampshire	100%		100%	100%	
New Jersey	100%		100%	100%	
New Mexico	100%		100%	100%	
New York	100%		100%	100%	
North Carolina	100%		100%	100%	
North Dakota	100%		100%	100%	
Ohio	100%		100%	100%	
Oklahoma	100%		100%	100%	
Oregon	100%		100%	100%	
Pennsylvania	100%		100%	100%	
Rhode Island	100%		100%	100%	
South Carolina	100%		100%	100%	
South Dakota	100%		100%	100%	
Tennessee	100%		100%	100%	
Texas	100%		100%	100%	
Utah	100%		100%	100%	
Vermont	100%		100%	100%	
Virginia	100%		100%	100%	
Washington	100%		100%	100%	
West Virginia*	100%		100%	83%	17%
Wisconsin	100%		100%	100%	
Wyoming	100%		100%	100%	

* Submitted 1984 data for certain VOC sources under agreement with EPA

TABLE 1-10. MISSING ITEMS FOR THE 1985 NAPAP EMISSIONS INVENTORY (1000 TON PLANTS, 25 TON POINTS)

NAPAP DATA ITEMS	MISSING ITEMS	
	1985*	Percent*
UTM Zone	8	0.4%
UTM Coordinates	4	0.2%
SIC	86	0.3%
Stack Height	158	0.5%
Stack Diameter	178	0.6%
Stack Temperature	726	2.4%
Stack Gas Flow Rate	220	0.7%
Plume Height	158	0.5%
Boiler Capacity	690	3.8%
Primary Control Equipment# (SO_2, NO_x, VOC)	18,332	19.9%
Secondary Control Equipment# (SO_2, NO_x, VOC)	19,958	21.6%
Control Efficiency# (SO_2, NO_x, VOC)	16,939	18.4%
Percent Annual Throughput	172	0.6%
Complete Normal Operating Schedule	704	2.3%
Emissions Estimate+ (SO_2, NO_x, VOC)	0	0.0%
Estimation Method (SO_2, NO_x, VOC)	6,409	6.9%
Year of Record (Emissions)	0	0.0%
Annual Operating Rate	1,316	5.9%
Maximum Design Rate	1,527	6.9%
Fuel Sulfur Content	807	3.6%
Fuel Ash Content	1,421	6.4%
Fuel Heat Content	1,463	6.6%

Based on 48 contiguous States and the District of Columbia

* Excludes exempted operating data from Texas for 1985

+ Excludes emissions estimates that are calculated by NEDS

# Within NEDS, States may report control equipment as blank to indicate that no information is available to the State or that the status of the control equipment is uncertain; this situation overestimates the number of items actually missed by the inventory process.

1.5 Documentation

An extensive Audit Trail was developed to document both problems with the data and the history of the data. All the results of the Quality Control measures performed on the data have been documented in memos kept in a QC notebook. When the problems resulted in corrective action, the changes to the data were listed in computerized files called the Audit Trail. The Audit Trail lists the source identifiers, the old and new data values, the date of the change, and the party responsible for the change.

Data tapes containing the final 1985 U.S. anthropogenic point and area source data are available. These tapes contain a more comprehensive collection of data than is described in this report. The Audit Trail files are also available to users of the data to help them identify the source of a data element. The QC notebook is part of the project docket.

SECTION 2

INTRODUCTION

2.1 EMISSIONS RESEARCH AND THE NATIONAL ACID PRECIPITATION ASSESSMENT PROGRAM

The National Acid Precipitation Assessment Program (NAPAP) was established by Congress in 1980 (Title VII of P.L. 96-294) to coordinate and expand research on problems posed by acid deposition in and around the United States. A fundamental objective of NAPAP's research program is the investigation of emissions sources that may contribute to acid deposition.

NAPAP's Task Group on Emissions and Controls has achieved this objective by developing historical and current inventories of acid deposition precursor emissions. Information about historical trends in emissions is required to analyze long-term trends in precipitation acidity and dry deposition and to study these deposition effects on forest, aquatic, agricultural, and material resources. Current emissions inventories are required to assess the impact of various source types and characteristics on the emissions and abatement of acid precipitation precursors. Inventories of current emissions are also required to investigate and verify atmospheric process models that simulate source-receptor relationships.

The development of current emissions inventories requires the investigation of literally hundreds of thousands of sources of air pollution. These include stationary or point sources such as refineries and utility boilers as well as area or dispersed sources such as motor vehicle emissions along highways. The analysis of these sources must include the calculation of emissions and documentation of those engineering parameters which affect the atmospheric transport of emissions, such as stack height. Because transport of pollutants plays a critical role in acid deposition processes, emissions inventories must encompass geographic areas larger than those in which acidification and deposition are thought to occur. Thus, the investigation of acid precipitation in the northeastern United States and Canada requires the development of emissions inventories for all States and Provinces in both countries.

Assembling current emissions inventories across such a broad geopolitical scale has required careful planning and coordination among the principal agencies responsible for inventory development. This cooperation was explicitly anticipated in Public Law 96-294, Sections 704(b)(1) and (11), which described the need for joint research in the States and in interested nations such as Canada.

In the United States, the Environmental Protection Agency's (EPA's) Office of Research and Development has the responsibility for completing the 1985 NAPAP Emissions Inventory for NAPAP's Task Group on Emissions and Controls. To accomplish this objective, EPA has worked closely with both State air pollution control agencies and the State and Territorial Air Pollution Program Administrators to plan, fund, assemble, and ensure the quality of the 1985 inventory data. The EPA and States have the authority to collect required emissions data under Title 40 of the Code of Federal Regulations, Part 51, Section 51.321 - 51.323.

In Canada, Environment Canada has the responsibility for developing national emissions inventories. In a manner analogous to the State-EPA partnership in the United States, Environment Canada works with Provincial air pollution control programs to collect emissions data for Canadian industries. The individuals identified in the acknowledgement in the preface to this report represent only part of the team of scientists and engineers in the many agencies that cooperated to develop the 1985 NAPAP Emissions Inventory.

2.2 1985 EMISSIONS INVENTORY OBJECTIVES

The goals and specifications for the 1985 NAPAP Emissions Inventory were developed to meet NAPAP acid deposition assessment and atmospheric modeling research objectives. Figure 2-1 summarizes key chemical reactions in the complex acid deposition process. These indicate that not only SO_2 and NO_x, but also oxidants such as ozone and hydrogen peroxide are required for the production of acids which cause acid precipitation. For example, sulfuric acid is formed by the oxidation of sulfur dioxide by ozone and by hydrogen peroxide in acidic clouds. Nitric acid is formed by the oxidation of nitrogen dioxide with hydroxyl radicals, which in turn are formed from volatile organic

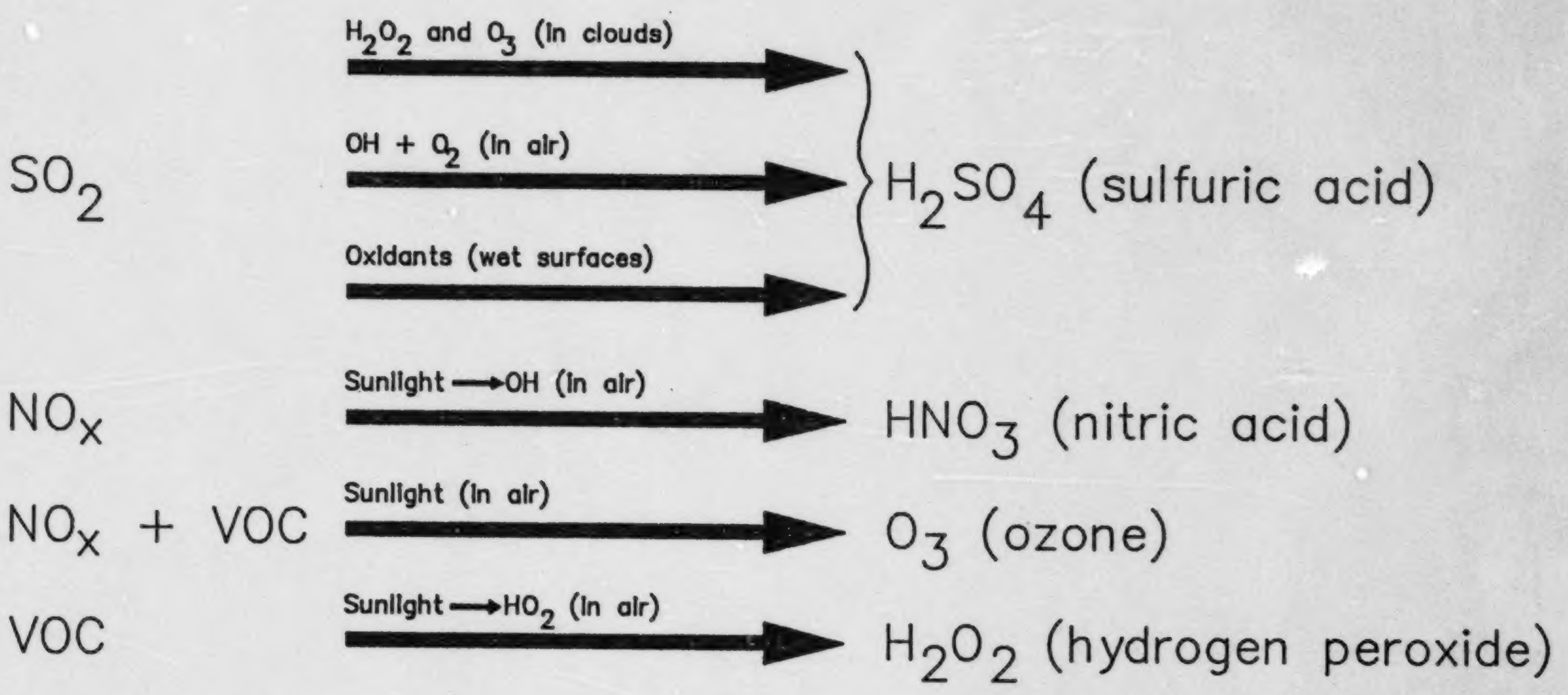

SO2
H2O2 and O3 (in clouds)
OH + O2 (in air)
Oxidants (wet surfaces)
H2SO4 (sulfuric acid)
NOx
Sunlight ⟶ OH (in air)
HNO3 (nitric acid)
NOx + VOC
Sunlight (in air)
O3 (ozone)
VOC
Sunlight ⟶ HO2 (in air)
H2O2 (hydrogen peroxide)

Figure 2-1. Acid rain precursors and products.

compounds and sunlight. Ozone is formed when nitrogen oxides and volatile organic compounds react in the presence of sunlight. Hydrogen peroxide is formed by volatile organic compounds reacting in the presence of sunlight.

In summary, the pollutant specifications for the 1985 NAPAP Emissions Inventory include sulfur dioxide, nitrogen oxides, volatile organic compounds, and, to a lesser extent, acid gases such as hydrochloric acid and hydrofluoric acid. The emissions inventory system employed by EPA and the States is designed to measure or directly estimate emissions of the first three of these pollutants. Emissions of many other pollutants, including the latter two listed above, can be estimated indirectly from other information collected by the inventory system. In the case of combustion sources such as boilers, the information required to estimate emissions of these other pollutants includes data on boiler design, the quantity and quality of fuel fired in the boiler, and the amount of fuel fired during the year. For other industrial process sources, required information includes an estimate of the feedstock or industrial process throughput during a year, and a detailed description of the industrial process.

Transformation and transportation of these acid precursor emissions begins almost immediately after they are emitted into the atmosphere. To a large extent, transformation processes depend on prevailing meteorological conditions, the atmospheric concentration of the pollutants, and the reaction rates of the available chemical species. However, the transport of these precursors emitted to the atmosphere through stacks or vents is determined in part by the height of the stack or vent above ground, and by the temperature, flow, and velocity of the pollutants leaving the stacks or vents.

Thus, specifications for the 1985 NAPAP Emissions Inventory must include not only pollutant emissions information, but also information about the location, engineering design, and performance of the industrial processes, stacks, and vents which inject the pollutants into the atmosphere. Some of this information is not required, however, for area or dispersed sources. These types of sources generally do not emit pollution through stacks or vents. Pollution from these sources is usually released at ground level; atmospheric transport of these emissions is determined by prevailing meteorological conditions.

Table 2-1 summarizes these objectives and specifications for the 1985 NAPAP Emissions Inventory. The specifications provide a logical prioritization for the inventory process that reflects the needs of the NAPAP research and assessment programs. The inventory process focuses on facilities emitting at least 1000 tons of SO_2, NO_x, or VOC. Fourteen data elements, the items of most importance to NAPAP, are given highest priority from among the 50 data items contained in each NEDS record. These priority elements include annual emissions estimates for SO_2, NO_x, and VOC, the maximum design and operating rates, the Source and Standard Industrial Classification Codes (SCC and SIC), emissions control equipment and efficiencies, fuel characteristics, location data, and operating schedules.

2.3 1985 Emissions Inventory Data

In analyzing and using the emissions inventory data contained in this report and the associated computer data bases, three factors should be considered carefully. These factors affect the type of conclusions that should be drawn from the use and analysis of the 1985 NAPAP Emissions Inventory data.

The first factor is that the emissions data contained in emissions inventories are based on estimates of emissions rather than on measured values. The development of an emissions inventory as broad in geographic and temporal resolution as the 1985 NAPAP Emissions Inventory would not be feasible if direct measurements were required for each of the hundreds of thousands of emissions sources that it encompasses.

Because of this constraint, the States and EPA have expended a great deal of effort to estimate emissions for each of approximately 3300 industrial processes currently operating in the United States and Canada. During the last decade, emissions from typical sources in most of the important industrial process categories have been measured using standardized and EPA-approved sampling techniques.

After a number of sources in each of the important industrial categories have been tested, the measured test results are averaged for each category to develop emission factors. These emission factors result from calculations that determine the quantity of a pollutant released as a function of some activity

Table 2-1. 1985 Emissions Inventory Priorities

Plant Size	Complete NEDS Submittal	Emission Estimates for SO_2	NO_x	VOC	TSP	CO	SCC	Control Equip/ Effic'y	Fuel/ Operat'n Data	Locat'n Data	Stack Data	Temporal Data	Other Key Data	Plants Confirm Emiss'n	SIC
I >500 TONS VOC & >1000 TONS OTHERS	H	H	H	H	M	L	H	H	H	H	1	H	M	2	L
II >100 TONS ALL	M	3	3	4	M	L	H	3	3	H	M	L	L	L	L

PRIORITY: H=HIGH M=MEDIUM L=LOW

1 - HIGH for stacks > 100 feet; LOW for stacks < 100 feet.

2 - HIGH for plants with emissions of SO and NO > 2500 tons.

3 - HIGH for combustion sources; MEDIUM for other industries.

4 - HIGH for petroleum refineries and chemical processors; MEDIUM for other industries.

that is directly associated with its release (such as the number of pounds of volatile organic compounds released to the atmosphere for each gallon of solvent used in a dry-cleaning process). The emission factor is multiplied by the activity level of that industrial process over a given period of time to estimate emissions. To estimate emissions at a given plant during a year, this calculation is carried out using annual activity estimates and emission factors for each of the industrial processes in operation during the year.

The second factor that must be considered when using and analyzing emissions inventory data is the uncertainty surrounding the emissions estimates. Because the inventory data are estimated rather than measured values, traditional methods of assuring data quality such as accuracy and precision cannot be used.

To date, research by NAPAP and EPA experts to develop new methods for calculating the uncertainty of emission estimates has not been completed. The research focuses on the most important parameters that must be accounted for in estimating emissions and transport for each of the industrial processes currently operating in the United States and Canada:

- the emission factor for each industrial process,
- the annual activity level,
- the variation of industrial feedstock constituents which can affect emissions over time (e.g., coal sulfur content),
- the efficiency and operational availability of air pollution control devices for each industrial process,
- the "allocation" factors used to disaggregate annual estimates into more resolved estimates such as seasonal or daily values, and
- data omission or translation errors which are introduced as the inventory data are first acquired in the field and then encoded on computer forms and transmitted electronically from one computer to another.

The third factor that must be considered when using emissions inventory data is the completeness and accuracy of the information in the data base. For the 1985 NAPAP Emissions Inventory, both EPA and State air pollution control agencies worked together to ensure that the data were as complete and accurate as possible. One indication of the level of attention that this effort received in both EPA and State agencies is the communication from EPA Administrator and Assistant Administrator to both EPA and State participants in the inventory (Appendix A).

Where funding or schedule constraints on the completion of the 1985 NAPAP Emissions Inventory prevented complete attainment of the NAPAP inventory objectives, priorities were established to ensure that the information of most importance to NAPAP would be obtained. These priorities, presented in Table 2-1, ensured that 1985 NAPAP Emissions Inventory data would, at a minimum, be accurate and comprehensive for virtually all of the stationary and dispersed sources of interest to NAPAP researchers.

2.4 OBJECTIVES AND STRUCTURE OF THIS REPORT

This report on the 1985 NAPAP Emissions Inventory is structured to provide users with the tools to enable accurate analysis of the computerized inventory information. It is divided into sections to meet four objectives: first, documentation of the development of the 1985 NAPAP Emissions Inventory; second, documentation of the quality control effort to ensure the quality of the inventory; third, presentations of selected analyses conveying the results of the quality control effort and summaries of 1985 emissions data with the conclusions that can be drawn from these data; and fourth, documentation of the QC and inventory data to provide users with the information necessary to properly assess the inventory content and data tapes.

Sections 3 and 4 are designed to meet the first two objectives of defining the inventory's process and scope. Section 3 describes in detail the methods which were used to assemble the 1985 NAPAP Emissions Inventory from design to implementation. Section 4 outlines the quality control plan and data quality objectives for the inventory.

Section 5 fulfills the third objective of this report by describing the inventory quality achieved and summarizing the data collected. It presents two different data analyses important to the user community: first, the degree to which the inventory met NAPAP objectives for content and completeness is analyzed, and second, the inventory emissions data are summarized and major conclusions from these data are drawn.

Finally, the final objective of additional documentation for an accurate assessment of the quality and extent of the NAPAP Emissions Inventory is provided in the Appendices, which present additional information: Appendix A contains the communication from the EPA Administrator and Assistant Administrator which defined the importance of the inventory effort, Appendix B provides a list of NEDS edit check software error messages, Appendix C details each State's emissions of SO_2, NO_x, and VOC by descriptive category, and Appendix D lists criteria pollutant emissions by SCC and area source category to provide an accurate benchmark when assessing the data tapes. Appendix E is a glossary of terms used in NAPAP inventory work with which readers may not be familiar.

The 1985 NAPAP Emissions Inventory is an assessment inventory, focusing on U.S. anthropogenic annual and seasonal emissions data for five criteria pollutants and four non-criteria pollutants. The criteria pollutant data have been obtained from the States and the non-criteria estimates have been calculated based on State-reported source-specific information. This inventory and report are not relevant to U.S. biogenic emissions, Canadian anthropogenic or biogenic emissions, or the speciated and temporally/spatially-resolved estimates which are specific to the modeling inventory. These inventories will be addressed in subsequent efforts and reports.

SECTION 3

METHODOLOGY

The purpose of this section is to describe the methods which were used to develop and collect emissions inventory data for the 1985 NAPAP Emissions Inventory. For the NAPAP inventory, the National Emissions Data System (NEDS), an existing EPA inventory computer system, was used to convey and store information. However, EPA and the States have modified, supplemented, and improved the NEDS for the 1985 effort, so that the system is substantially different than the conventional system used in previous years.

The organization of this section reflects the bipartite NEDS file structure. The first file, which consists of State-reported point source data, is discussed in Section 3.1. The second file, which contains area source data calculated by EPA, is described in Section 3.2. This chapter also presents information on two other types of data collected at the national level: (1) utility-related fuel use and boiler data (Section 3.1.6), and (2) sources, procedures, and estimates of noncriteria pollutant emissions of interest to acid deposition assessment (Section 3.3), including primary sulfates, hydrogen fluoride, hydrogen chloride, and ammonia. These methods were developed to calculate NAPAP anthropogenic emission estimates from point and area sources for acid rain precursors in the U.S.

The point source emissions data base is collected at the State level. It includes emissions estimates and supporting data gathered by State air pollution control agencies from point sources within each State. The national data base is the sum of these State-level source inventories, collected for each industrial process and compiled successively at the source, State, and national levels.

The area source data base represents anthropogenic emissions from true area sources (e.g., mobile sources), from plants which emit less than 100 tons per year (TPY), and from point sources which emit less than 25 TPY or which are too difficult to inventory individually. Area source emissions are calculated by EPA through a process in which county-level emissions are estimated using category-specific emission factors and activity levels (e.g., published fuel deliveries), and then summed to produce national emissions estimates. These fundamentally different approaches characterize the distinction between the point and area source data bases, which are described below in detail.

3.1 POINT SOURCE DATA

3.1.1 NEDS Structure

Subpart Q of 40 CFR Part 51 (Sections 51.320 through 51.323) authorizes annual reporting by the States to EPA of emissions inventory data for all stationary sources (i.e., plants) emitting 100 TPY or more of criteria pollutants. An exception to the 100-ton limit is made for carbon monoxide (1000 TPY). For plants meeting these requirements, any points (e.g., stack or process within the plant) emitting 25 TPY or more of any criteria pollutant (250 tons for CO) are to be reported. Points with lower emissions may also be reported by the State if resources are available. Points and sources not meeting these criteria and not reported in the NEDS point source inventory are considered area sources. Their emissions are included in county-wide area source emissions estimates as described in Section 3.2.

Data reported for point sources in NEDS may be categorized according to the following groups:

General source information -- name, address, type(s) of sources(s), Standard Industrial Classification, year of record, and comments.

Emissions data -- operating or production rates and capacities, estimated emissions, estimation method, and type and efficiency of control devices for each pollutant.

Modeling parameters -- UTM coordinates of source, stack height and diameter, exhaust gas temperature, and gas flow rate.

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Modeling parameters -- UTM coordinates of source, stack height and diameter, exhaust gas temperature, and gas flow rate.

Compliance information -- allowable emissions, compliance status, and compliance schedules.

NEDS point source data are organized into three hierarchical levels: plant, point, and process.

Plant level data apply to an entire facility.

Point level data apply to individual emission points within a plant. A plant may contain any number of emission points. A point is that portion of a facility that may be considered individually for emission purposes. A point may contain one or more processes or pieces of equipment that contribute to the emissions from the point. In most cases, a point emits pollutants through a single confined location such as a stack. A point may also be an aggregation of two or more similar pieces of equipment which, taken separately, would not qualify for inclusion due to emissions of SO_2, NO_x, or VOC of less than 25 TPY. In addition, defined emissions sources without stacks may be included in NEDS as point sources (for example, fugitive emissions from plant equipment, storage piles, and lagoons).

Process level data apply to individual processes within a point and are utilized to calculate emissions. Each process is defined by a Source Classification Code (SCC).[1] In general, for each SCC there are emission factors which relate the quantity of pollutants generated by a process to an annual process operating rate. These emission factors are used to compute emissions. Multiple processes and multiple SCCs may be grouped under one emission point, as in the cases of boilers using two fuels or two separate processes sharing the same stack.

Table 3-1 illustrates the hierarchical structure of the NEDS point source data file and the individual data items at each level. Individual data items of importance to NAPAP are discussed in the following section. Table 3-1 has omitted the "year of record" entries for all levels, as well as other items not currently in use.

3.1.2 Priority Data Elements/NAPAP Emissions Inventory Priorities for 1985

To help guide data collection efforts for 1985, data collection objectives were prioritized as summarized in Table 3-1. This prioritization reflected the needs of the NAPAP research and assessment programs for atmospheric transport, as well as EPA and State inventory needs.[2] Emissions of SO_2, NO_x, and VOC

TABLE 3-1. NATIONAL EMISSIONS DATA SYSTEM (NEDS) DATA STRUCTURE

PLANT LEVEL DATA
- State, county, Air Quality Control Region, city and UTM zone codes
- Plant identification number
- Plant name, address and contact person

POINT LEVEL DATA
- Point identification number
- Standard Industrial Classification code
- UTM coordinates
- Stack/plume data (height, diameter, temperature, flow rate)
- Points with common stack
- Boiler design capacity
- Control equipment (primary amd secondary device codes for each criteria pollutant and overall efficiencies by pollutant)
- Operating schedule (by season, hrs/day, days/wk, wks/yr)
- Emission estimates for criteria pollutants (actual, with estimation method, and allowable)
- Compliance data (status, schedule, update, regulations)

PROCESS LEVEL DATA
- Source Classification Code
- Operating rates (annual, maximum hourly design)
- Fuel content (sulfur, ash, heat)

were assigned highest priority. Emissions of TSP were assigned an intermediate priority level. The highest priority level was assigned to plants emitting at least 1000 tons of these pollutants during 1985. The next level of priority for these pollutants was assigned to plants emitting 100 to 1000 tons during 1985.

Table 2-1 reflects the NAPAP/EPA consensus on the fourteen highest priority data elements from among the fifty available in NEDS. To obtain a nationally consistent baseline, it was critical to obtain actual 1985 data for emissions estimates and operating rates. The other priority data elements fell into three categories: emissions estimation data, spatial/temporal data, and data to identify inconsistencies. All these items were selected for their importance to the acid deposition research and assessment communities.

Annual Emissions Estimate--Complete reporting of emissions for all significant emission points (defined as points emitting more than 25 tons in 1985 of SO_2, NOx, or VOC) was most important. To establish the best possible national emissions inventory for 1985, maximum use of standard procedures for calculating emissions was recommended. Emissions calculation procedures are discussed in more detail in Section 3.1.7. The inclusion of calendar year 1985 estimates was critical to establish a consistent baseline.

Annual Operating Rate--The annual operating rate is the amount of fuel consumed, amount of product produced, or other material throughput during 1985, as defined by the SCC (below). In most cases this information was obtained from plant records. It was inappropriate to estimate annual operating rates by simply multiplying the hourly maximum design rate by the hours of operation, unless it was known that the source operated at or near full capacity throughout the year. Estimates of annual operating rates took into account a "capacity utilization factor," i.e., the fraction of full production or consumption capacity reflecting normal operations during 1985. Again, 1985 data were critical to the effort.

SCC--To properly classify sources in a standard manner, SCC numbers were obtained from the NEDS SCC listing.[1] An SCC is an 8-digit code divided into four levels of identification, signifying 1) the category process, 2) the major industry group, 3) the major product, and 4) different operations at the point source. The SCC defines specific units for operating rates and carries with it a set of emission factors, which may be used to calculate emissions (if appropriate). A maximum of 10 SCCs could be assigned for any point, and no duplication of SCCs was allowed at a single point.

Control Equipment and Control Efficiency--Entries were required for all emission points where control equipment applicable to SO_2, NO_x, or VOC emissions was in place. Control efficiencies were taken to be the best available estimates of annual average actual control efficiencies. NEDS provides for reporting both primary and secondary control devices and their control efficiencies for each pollutant.

Fuel Sulfur/Fuel Ash--Fuel sulfur and ash contents were reported as weight percents, representing weighted annual averages for the fuel burned. Fuel sulfur was necessary for the calculation of SO_2 emissions from coal, oil, process gas, and coke combustion; fuel ash was used to calculate particulate emissions from coal and coke combustion.

UTM Zone and Coordinates--The Universal Transverse Mercator (UTM) zone and coordinates provided geographical reference within a standard grid system. These coordinates permitted each point or source to be located to the nearest 0.1 kilometer.

Stack Data--Height (above ground level) and inside diameter of each emissions stack were reported. Height was ordinarily reported to the nearest 10 feet and diameter to within one-tenth foot. In addition, the exhaust gas temperature (^{o}F) and flow rate (actual cubic feet per minute) were reported. Emission points with common stacks were designated where applicable. A plume height (i.e., release height) was reported in cases where no stack existed (e.g., storage tanks). These data are essential to estimate plume rise and atmospheric transport of emissions.

Normal Operating Schedule--The normal number of hours per day, days per week, and weeks per year each point operated was indicated. This schedule allows the temporal resolution of emissions estimates by defining the variability of operations.

Percent Annual Throughput--Seasonal variations in production rate or throughput at a point were indicated by percentages for each season, to allow temporal resolution of emissions estimates among the four seasons.

Fuel Heat Content--Fuel heat content represented the gross or higher heating value of each fuel. This value was combined with boiler design capacity and hourly maximum design for a cross-check to identify inconsistencies between these three items and annual operating rate.

Boiler Design Capacity--Boiler design capacity was defined as the maximum gross heat input rate for a boiler. It was reported in million BTU/hour. This rate was applicable only to emission points representing boilers. For all other points, including other combustion sources, the entry was zero. If a point represented a number of small boilers grouped together, the boiler capacity was taken as the total for all boilers at the point.

Hourly Maximum Design Rate--Maximum design rate was defined as the highest operating rate expected for a source. Where the SCC units were not time dependent (e.g., capacity of storage tanks), a value of zero was used.

SIC--The Standard Industrial Classification was recorded for the source. This item provided a cross-check with the SCC to identify inconsistencies, and is used as a standard identifier in data retrievals and analyses.

3.1.3 1985 Emissions Data Collection Effort

To meet the objectives of the 1985 NAPAP Emissions Inventory, EPA and State air pollution control agencies developed a plan to improve the quality and comprehensiveness of the point source data base. A major portion of the plan covered data collection efforts. EPA committed substantial resources to assisting the States in developing and executing the 1985 NEDS. This planning resulted in standardized data collection and emissions estimation methods. The organization of the collection effort addressed the following eight areas, which are discussed individually below:

- Survey by the State and Territorial Air Pollution Program Administrators (STAPPA) to establish realistic objectives,
- Analysis of data gaps in each State's inventory,
- Written guidance developed for the States and EPA prior to the inventory,
- Standardization of emissions estimation procedures,
- Organization of the inventory process to the State level,
- Implementation of emissions confirmation procedures,
- Institution of quality control procedures, and
- Reliable transfer of emissions data from the State to EPA.

3.1.4 STAPPA Survey

The EPA worked with the STAPPA Acid Rain Subcommittee to identify the capabilities and needs of the States in the development and execution of the inventory. STAPPA surveyed the States to determine the level of inventory effort the States could provide for 1985 with existing resources, and the types and levels of support needed by the States to meet the objectives of the 1985 NAPAP Emissions Inventory. The STAPPA survey demonstrated that States would encounter resource shortfalls in meeting schedule and data quality objectives. As a result, EPA committed financial and contractor support during 1986 and 1987 to States requesting assistance in five inventory areas: inventory development, emissions confirmation, quality control, data coding, and data editing.

3.1.5 Written Analysis of Deficiencies

In order to assist States in targeting resources for the 1985 NAPAP Emissions Inventory, NADB reviewed each State's most recent (i.e., 1984) NEDS data in early 1986. Each State NAPAP contact and EPA Regional contact received a written analysis of NEDS data. This analysis identified data problems for sources of SO_2, NO_x, or VOC, greater than 1000 TPY which, if not corrected, would cause data to fall short of the NAPAP requirements or would require State resolution during quality control review. These potential problems included these items:

- Missing high priority data items,
- Allowable emissions reported as actual emissions, and
- Systematic problems such as invalid control codes or missing emissions estimates.

3.1.6 Guidance

Establishing a common methodology for EPA and the States for data collection, emissions estimation, and quality control (QC) was an important early step in assembling an adequate and consistent data base. This step was important for two reasons. First, the resulting State data bases would be developed on a nationally consistent basis. Second, QC procedures could be developed to build QC directly into the data collection process, where errors could be located and corrected most efficiently. Essential elements of procedural and technical guidance were communicated to EPA, State, and contractor personnel through two workshops and companion manuals. In addition, utility data collected by DOE were furnished to the States to aid compilation of utility data in this inventory.

3.1.6.1 Technical Guidance

The first workshop was held in October 1985 for EPA, NAPAP, and State personnel. Manuals addressing data collection procedures,[3] emissions confirmation for major source categories,[4] hydrocarbon emissions estimation[1] (factors for reactive VOC), and 1985 DOE utility fuel use data[5] were distributed at the workshops and also made available to interested State inventory personnel. The subjects covered by these documents will be discussed later in this chapter. Additional written guidance concerning NAPAP inventory priorities, confirmation procedures, and QA/QC checks[6,7] was distributed to EPA Regional Offices and States in December, 1985.

A second workshop, specifically for Contractors assisting the States, was held in May 1986. In addition, States were supplied criteria pollutant emission factors,[1] and particulate speciation[8] and VOC speciation guidance,[9] for use in the inventory effort. These workshops and manuals established a common methodology for collecting, coding, editing, and transferring the 1985 NAPAP Emissions Inventory.

3.1.6.2 Utility Data

The electric utility industry represents a significant source of acid precipitation precursors in the United States, accounting for approximately two-thirds of total anthropogenic SO_2 emissions and one-third of total anthropogenic NO_x emissions. The increasing trend toward tall stacks at utilities has increased the likelihood of long-range pollutant transport, making facility data such as stack parameters important to modeling efforts. NAPAP priority data were collected from utilities within the framework of the NEDS inventory; however, there are other data bases which contain similar information.

The Department of Energy (DOE) requires utilities to report emissions and operating data on DOE Forms 767, 759, and 423. Form 767 provides boiler-level data, while 759 and 423 report plant-level information. Historically, DOE data have been considered to be the most comprehensive available. For 1985, summaries of the utility data from these forms were made available to the States at the beginning of the inventory effort. These data were employed to supplement the 1985 NAPAP Emissions Inventory data, as well as to identify inconsistencies between data bases on a State, plant, and point basis. In addition, a comprehensive review of Forms 767, 759, and 423, and of the 1985

NAPAP Emissions Inventory was conducted in order to identify any systematic problems in the NAPAP inventory regarding utilities. Further information on these comparisons is found in Sections 4.0 and 5.0. Based on this review, NAPAP-reported data appeared as reasonable and accurate as DOE data.

A few States were not able to provide all the utility data requested by NAPAP. In these cases, DOE data supplemented State data collected through NEDS. The State reviewed the DOE information, and updated NEDS information in light of the DOE results. In each instance, the State chose the data best representing operations at individual utilities.

3.1.7 Emissions Estimation Procedures

One of the emissions estimation objectives for the 1985 NAPAP Emissions Inventory was to use calculated estimates of actual emissions during 1985. NEDS recognizes two distinct estimation procedures: one using individual source-specific emissions data and one using emission factors. EPA requested that States use standard emissions estimation methods, which are described below, whenever applicable, and presented a hierarchy for utilization of the acceptable methods.[2] Each method is documented with a unique code in NEDS and can be tracked over time for each emission point.

States were asked to report estimated emissions based on individual source data if available. These calculations are based on continuous emissions monitoring (CEM) data, source test data, or materials balance information as reported by the source or calculated by the control agency. Source-specific data are considered the most accurate data for estimating emissions.

If individual source data were not available, States were asked to calculate emissions using an emission factor. EPA recommended that the AP-42[10] emission factors and methods be reviewed in selecting an emission factor. If no AP-42 factor was available, emission factors appearing in the NEDS SCC and Emission Factor Listing[1] were to be used if available. This resource lists AP-42 factors as well as additional factors not from AP-42, and AP-42 factors assumed to be transferable to other SCC categories. States also had the option of selecting State emission factors based on knowledge of the operation of sources within the State.

If a State was not able to estimate emissions with any of the methods discussed, two options were still available. For data from sources without emission factors, the State could code data so that NEDS would calculate emissions when appropriate emission factors were developed. States could also use this option to indicate that AP-42 factors on file in NEDS should be applied to operating data to calculate emissions. As a last option, the State could use its judgment to estimate emissions based on knowledge of the particular point (e.g., emissions test data from similar State sources).

3.1.8 Inventory Process at State Level

Point source data were collected by State air pollution control agencies for the calendar year 1985. The format and logistics for the actual collection were handled by each State individually. A majority of States used either the NEDS or the Emission Inventory System/Point Source (EIS/PS) system to store the collected inventory data. In either case, conducting the inventory entailed four steps:

- Identification of facilities,
- Questionnaire development and/or distribution,
- Codification of resulting data, and
- Development of a NEDS-compatible computer tape.

The resources for planning and conducting this inventory varied from State to State. In many cases, States needed to contact all major emission sources. Where States' resources permitted, the States utilized their normal annual inventory procedures while emphasizing NAPAP priority data items in their collection effort. Due to resource constraints, not every State was prepared to conduct an inventory of this scope for 1985. Financial aid and Contractor assistance were provided to States, according to each specific State's needs, as described below.

When requested, EPA provided assistance to the States in collecting and coding data. This effort relied on previous inventories, expertise of State personnel responsible for air pollution sources, and/or an evaluation of SICs and number of employees. In general, State expertise was sought through consulting the central air pollution control agency, working with State personnel, and accessing current files. Working with a designated State inventory contact, EPA helped the State devise a questionnaire to request all key NAPAP data elements, actual emissions estimates, and any additional data of interest to the State. This questionnaire was sent out by the State and results were received and filed at the State air pollution control agency. Facility response was excellent, due in part to efficient State follow-up. This contact allowed missing or questionable data elements to be reviewed directly with the facility, and permitted prompt initiation of applicable confirmation procedures with the facility, as discussed in the following section.

Most States required assistance to translate the raw data returned from facilities into a NEDS-compatible format (i.e., NEDS coding forms, State Emissions Inventory System, or microcomputer data base) and to complete the necessary QC procedures. Because of the diversity of inventory formats among States, carrying out the standardized methodology for data coding was a significant challenge. One efficient method of data coding was to use a microcomputer and software developed for this purpose. The software allowed a user with an IBM™ or compatible PC to load data into dBase™ data base management files through a series of menus. These files were then used to produce a magnetic tape in NEDS card image format.

3.1.9 Confirmation

Where State resources permitted, emissions estimates for large emitters were confirmed. Confirmation involved affording large emitters an opportunity to review the reasonableness and acceptability of State emissions estimates and make comments to the State. A lower limit of 2500 TPY SO_2 or NO_x emissions was chosen for confirmation. The effort was intended to improve the accuracy of the inventory for very large SO_2 and NO_x sources without imposing undue burden on the State.

Confirmation was accomplished in one of two ways. In the first, predominant method, the State provided emissions estimates and calculations for each unit process (SCC) to the facility contact for review. After review of the State estimate, the source indicated agreement with the estimate or provided an alternative estimate that was more accurate. In case of disagreement, the source provided alternative calculations for its estimate. State and source were to attempt to reach a final agreement on the appropriate emissions estimate, but ultimate responsibility for selecting the most accurate estimate rested with the State.

A second method involved requesting the facility to provide emissions estimates and supporting data for each unit process at the time of the yearly inventory. The State would then review each estimate and either accept or reject it. As above, the State retained responsibility for submitting the most accurate estimate.

For each facility emitting at least 2500 tons of SO_2 or NO_x in 1985, a confirmation report was prepared by the State or by the Contractor assisting the State. This report consisted of a cover memorandum from an appropriate State agency official and a table representing all facilities meeting the criteria. The table contained source name, NEDS ID number, actual 1985 SO_2 and NOx emissions, and confirmation status. The confirmation status could be one of the following: (1) agreement of State and source, (2) disagreement -- State estimate chosen, (3) disagreement -- source estimate chosen, (4) no comment by source, or (5) no confirmation attempted. Provisions were made for distinguishing between major facility-level conflicts and minor point-level disagreements. A final confirmation report was required from the State by the date of the final NEDS submittal.

States were encouraged to confirm estimates below the 2500 ton criterion. Also, large sources of VOC were confirmed in a number of States. Insofar as States were able to confirm emissions below levels mandated as part of the effort, confidence in emissions totals was improved.

3.1.10 Quality Control

For 1985 emission submittals, EPA Regional Offices were responsible for working with State air pollution control agencies to perform quality control (QC) of NEDS data on computer tape.[11] A computerized edit routine was specifically revised for this purpose, and assistance was provided to run QC checks on State data prior to submittal to the Regional Office. The purpose of these checks was to identify missing and questionable data so that the States could correct errors and validate questionable data. These efforts are discussed extensively in Section 4.

The preliminary edit identified two types of problems in the data. First, data were rejected due to incorrect coding; points having these errors were unacceptable to NEDS and could not be entered into the system without correction. These were the most serious errors, and included invalid NEDS identification codes (i.e., the alphanumeric code that uniquely identifies each plant and point in the NEDS point source file), invalid estimation method codes, or invalid SCCs. The second type of problem identified was questionable data. Such data included inconsistent or missing emissions estimates; inconsistent or incorrect stack and location parameters; and inconsistent design, operating, and emissions parameters.

After the State and Regional Office investigated and corrected these error messages, the tape was forwarded to EPA'S OAQPS and AEERL. These groups then reviewed the submittal to identify any remaining questions or problems, which were returned to the Regional Offices for resolution. This quality control loop for the point source data base is described in much greater detail in Section 4.0.

3.1.11 Transfer to NEDS

Each State's submittal was entered into NEDS after final QC processing. The goal was to transfer the State's data to NEDS accurately, ensuring that NEDS reflected the data on file at the State. This update procedure was complicated by compatibility problems with the data formats available from some States. In some cases, these problems arose from unique State storage and retrieval systems. At other times, when a State had modified EIS/PS to better serve its own needs, the change created translation difficulties when data were transferred to NEDS.

These problems were resolved in two ways. First, adjustment or creation of a translation program was attempted by OAQPS/AEERL in cooperation with the State. Transfer of high priority data elements was emphasized during these procedures. If this process was not successful, then either a data translation was carried out and corrections were made by hand, or the data were entered directly into NEDS from NEDS forms. In either case, the final NEDS product faithfully transcribed high priority 1985 NAPAP Emissions Inventory data from the State's data base.

3.2 AREA SOURCES

3.2.1 Overview

For the 1985 NAPAP Emissions Inventory, extensive modifications were made to the traditional NEDS area source methodologies, which extended the inventory to sources not previously considered (e.g., treatment, storage, and disposal facilities), and improved VOC emissions coverage (e.g., fugitives). Area source data files developed from NEDS serve as the basis for the 1985 NAPAP area source inventory. These include mobile sources and point sources too numerous or difficult to classify individually. Historically, NEDS area source data have been developed mainly by OAQPS from data voluntarily submitted by State agencies. More complete documentation and references are available in Area Source Documentation for the 1985 NAPAP Inventory.[12]

NEDS area source emissions estimates are updated annually by a series of computer programs which multiply each current area source activity level (e.g., fuel delivery) by the appropriate emission factor which accounts for emissions removed by any control technology. County emissions estimates are then summed to produce national emissions estimates.

Activity levels are derived primarily from related information published by other Federal agencies, supplemented by special data developed by EPA for the purpose of developing NEDS area source inventories. Published data such as fuel use by State, motor vehicle miles of travel (VMT) by State and county, and forest fire acres burned by State are used with related data such as employment, population, and miscellaneous geographic or economic data to derive annual county estimates of the activity levels for each of the NEDS area source categories. The activity levels derived are adjusted to account for point source activity (such as fuel use by point sources) so that the area source data reflect only the activity levels (and resulting calculated emissions) that are not accounted for by point sources.

Area source emissions estimates for five pollutants (particulates, SO_2, NO_x, VOC, and CO) are calculated for each area source category utilizing appropriate emission factors from the NEDS area source emission factor file. For most categories, emission factors were originally obtained from the EPA Compilation of Air Pollutant Emission Factors (AP-42).[10] For many categories, the same emission factors are used for all counties; however, for some source categories, State- or county-specific emission factors account for local variables that affect emissions. These more specific factors are used in NEDS calculations for all highway motor vehicle categories, fugitive dust categories, and for other selected categories in a few counties where data are available to develop more applicable emission factors than the national emission factors. Computer-calculated emissions can also be overrridden by hand-calculated emissions that may be more accurate than values calculated from emission factors.

As shown in Table 3-2, area sources in the 1985 NAPAP Emissions Inventory are divided into five major groups: Stationary Sources, Mobile Sources, Solid Waste Disposal, Miscellaneous Area Sources, and Additional Area Sources. Additional Area Sources include categories for which methodologies have been developed to estimate emissions for the 1985 NAPAP Emissions Inventory. Brief summaries of the methods used for these five major groups are provided below, followed by detailed descriptions for each group.

3.2.1.1 Stationary Sources

Many stationary emissions sources are point sources which emit less than 25 TPY and which are thus not included individually in the point source

Table 3-2. 1985 NAPAP AREA SOURCE CATEGORY GROUPS

Stationary Sources
- Residential Fuel
- Commercial and Institutional Fuel
- Industrial Fuel

Mobile Sources
- Highway Vehicles
- Off-Highway Vehicles
- Railroad Locomotives
- Aircraft
- Marine Vessels

Solid Waste Disposal
- On-Site Incineration
- Open Burning

Miscellaneous Area Sources
- Evaporative Losses from Gasoline Marketing
- Evaporative Losses from Organic Solvent Consumption
- Unpaved Roads
- Unpaved Airstrips
- Construction
- Miscellaneous Wind Erosion
- Land Tilling
- Forest Wildfires
- Managed Burning (Slash/Prescribed Burning)
- Agricultural Burning
- Frost Control (Orchard Heaters)
- Structural Fires

Additional Area Sources
- Publicly Owned Treatment Works (POTWs)
- Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDFs)
- Fugitive Emissions from Synthetic Organic Chemical Manufacturing
- Bulk Terminals and Bulk Plants
- Fugitive Emissions from Petroleum Refinery Operations
- Process Emissions from Bakeries
- Process Emissions from Pharmaceutical Manufacturing
- Process Emissions from Synthetic-Fibers Manufacturing
- Crude Oil and Natural Gas Production Fields
- Cutback Asphalt Paving Operations

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inventory. The stationary sources category consists of small fuel-burning sources, and is divided into three major categories: Residential Fuel, Commercial and Institutional Fuel, and Industrial Fuel. Each category is further subdivided into fuel types for which consumption data are estimated using algorithms and published fuel use data. Consumption estimates used as the measure of activity levels are then multiplied by emission factors from AP-42 to obtain emissions estimates.

Residential Fuel--The residential fuel category includes estimated emissions for residential activities which utilize fuel for water heating, space heating, and cooking. Emissions contributed by residential fuel consumption are calculated for five fuel types using an algorithm that considers heating degree-days, number of residential units, and median number of rooms per dwelling. The estimated county activity levels for each fuel type are then normalized to be consistent with published State data.

Commercial/Institutional Fuel--Area source emissions from fuel use by commercial and institutional sources include emissions from hospitals, hotels, laundries, schools, and universities. County consumption data for five fuel types are estimated for the five identified commercial subcategories. Algorithms are based on data such as employment, climatological data, population, enrollment, and number of beds per institution. Total fuel consumption is distributed by the subcategories to each fuel type, using housing data and published State fuel consumption data. Fuel consumption estimates for the five subcategories are summed and compared with published State fuel totals. If the estimated fuel use exceeds the published State total, county estimates are normalized to agree with the State total. If the estimated fuel use is less than the State total, the difference is added to the estimated subcategory totals and allocated to counties by population.

Industrial Fuel--Emissions for the industrial sector are calculated as follows. First, State-level industrial area source fuel consumption estimates are determined by subtracting industrial point source fuel consumption totals from published State totals. Next, the area source fuel use estimates are allocated to counties using county employment data for the manufacturing sector

(Standard Industrial Classification groups 20 through 39). The county employment data are adjusted to exclude employment at point sources and are weighted to reflect differences in fuel use per employee for each two-digit SIC group. The industrial sector includes both external and internal combustion sources.

3.2.1.2 Mobile Sources

Mobile sources which contribute to area source emissions are divided into Highway Vehicles, Off-Highway Vehicles, Railroad Locomotives, Aircraft, and Marine Vessels.

Highway Vehicles--For the purpose of calculating fuel consumption, highway vehicles are disaggregated into four categories on the basis of use and gross vehicle weight. The categories include light duty gasoline vehicles, light duty gasoline trucks, heavy duty diesel vehicles, and heavy duty gasoline vehicles. NEDS allocates fuel consumption based on vehicle registration data and published average miles traveled (where available) by vehicle type. Fuel consumption, average fuel efficiencies, and mileage by road type in each county are used to determine vehicle miles traveled (VMT) for three road classes: limited access roads, rural roads, and urban roads. This allocation separates the total VMT for a county into road speed classes. Emission factors obtained from the execution of an EPA computer model are applied to determine emissions for each vehicle type and speed class.

Off-Highway Vehicles--Emissions from off-highway vehicles are generated by activities of gasoline and diesel vehicles which do not utilize road systems. Vehicles contributing to off-highway emissions are divided into six general categories: farm equipment, construction equipment, industrial equipment, motorcycles, lawn and garden equipment, and snowmobiles. Consumption is estimated separately for each category by either apportioning national fuel consumption to counties on the basis of employment, population, etc., or by calculating county or State totals by applying fuel consumption rates to average usage figures and equipment populations. Estimated fuel use is normalized to agree with published State totals, where available. For each category, emission factors from AP-42 are weighted using equipment populations. Off-highway motorcycle emissions are calculated using data representing uncontrolled emissions from an EPA computer model.

Railroad Locomotives--The activity level for railroad locomotive use of distillate oil is calculated by allocating published State consumption data to the county level based on county population statistics. Resulting consumption data are used with AP-42 emission factors to determine emissions.

Aircraft--Activity level estimates for aircraft (private, military, and commercial) utilize aircraft operations data and aircraft type populations to estimate number of landing/takeoff cycles (LTOs) in each group. Emission factors from AP-42, defined as emissions per LTO, are multiplied by LTOs to obtain emissions.

Marine Vessels--Estimation of marine vessel consumption for distillate oil, residual oil, and gasoline is based on published consumption data. Distillate oil and residual oil used by vessels are allocated to counties using data on the number of vessels visiting major ports and tonnage of cargo handled in each port. Gasoline vessel consumption computations utilize inboard and outboard motorboat registrations and published average consumption data to determine consumption. County allocation is based on inland water area, coastline, and the number of months suitable for recreational boating. Consumption data are multiplied by emission factors from AP-42 to obtain emissions estimates.

3.2.1.3 Solid Waste Disposal

The solid waste disposal category includes on-site refuse disposal activities by residential, commercial/institutional, and industrial sectors. Solid waste generation for open burning and on-site incineration is calculated using population data, per capita generation factors, and information from related point source categories. Activity levels are multiplied by specific emission factors from AP-42 to obtain emissions estimates.

3.2.1.4 Miscellaneous Area Sources

NEDS area sources which are not defined by the other categories are compiled in the Miscellaneous Area Sources category. Miscellaneous area sources include Gasoline Marketing, Organic Solvent Consumption, Unpaved Road Travel, Unpaved Air Strip Use, Forest Wildfires, Managed Burning, Agricultural Burning, and Structural Fires.

In brief, activity levels estimated using category-specific data are multiplied by emission factors to obtain emissions estimates. Activity levels for Gasoline Marketing are determined using county retail service station sales data. Activity levels for Organic Solvent Consumption are determined by allocating national estimates of organic solvent consumption by end-use category to counties according to manufacturing employment data or population. The Unpaved Road Travel category utilizes unpaved road miles and rural population as the basis of county allocation. Unpaved Airstrip Use is estimated by landing/takeoff (LTO) cycles occurring in the county. Number of acres burned and fuel loading factors are used as activity levels for Forest Wildfires, Managed Burning, and Agricultural Burning categories. The Structural Fires category utilizes the number of building fires, allocated to the county level by population.

3.2.1.5 Additional Area Sources

The 1985 NAPAP Emissions Inventory will provide detailed county-level VOC emissions estimates for additional area sources which previously have not been included in the NEDS area source categories. In this section, methods have been developed for many categories traditionally considered point source categories, such as Bakeries and Synthetic Fiber Manufacturing. These categories were included to reconcile the difference between reported total national air pollutant emissions estimates for these categories and emissions already accounted for by the NEDS point source data files. The remaining categories such as Publicly-Owned Treatment Works (POTWs) and Hazardous Waste Treatment Storage and Disposal Facilities (TSDFs) have been included as area sources due to the difficulty in measuring emissions from specific points in these facilities (e.g., aeration basins).

In the following sections, detailed activity level and emission factor calculations are described with references.

3.2.2 Stationary Sources

Stationary sources which contribute to area source emissions have been divided into three major categories: Residential Fuel, Commercial and Institutional Fuel, and Industrial Fuel. Collectively, these categories account for all stationary fuel combustion activity not usually reported as point sources. Methodologies for activity level estimation and emission factor derivation are discussed for each category and fuel type.

3.2.2.1 Residential Fuel

The residential fuel category estimates emissions for residential activities which utilize fuel for water heating, space heating, and cooking. Emissions contributed by residential fuel consumption are broken down by five fuel types including anthracite coal, bituminous coal, distillate oil, natural gas, and wood. For each of the listed fuel types, activity levels measured by fuel quantity consumed in weight or volume units are multiplied by emission factors from AP-42 to obtain emissions estimates.

In the following methodologies for the calculations of activity levels, consumption is determined for each type of fuel using two general steps:

- County consumption is calculated using an algorithm based on significant variables for which county-specific data are available (i.e., degree-days, number of rooms per dwelling, number of dwellings, etc.).
- Resulting county consumption estimates are normalized to reflect published State consumption data by the following equation:

$$\text{Normalized County Consumption} = \text{Estimated County Consumption} \times \frac{\text{Published State Consumption}}{\text{Estimated State Consumption}}$$

Anthracite and Bituminous Coal--The basic methodology for allocating residential consumption of anthracite and bituminous coal to individual counties involves the use of an algorithm which calculates coal consumption from the number of dwelling units and heating degree days. Adjustments are made to census housing data to account for trends in the number of coal-heated dwelling units, and to disaggregate the total coal consumption into anthracite and bituminous components using current coal market data. The results are then normalized as necessary to reflect published coal consumption.

Distillate Oil--Consumption of distillate oil by residential sources is determined using an algorithm which calculates consumption of fuel for space heating and water heating using the annual heating degree days and the median number of rooms of occupied dwelling units for each county for the most recent census year. The value of each county's consumption is then normalized as necessary to agree with total State consumption.

Natural Gas--In the NEDS inventory, residential natural gas consumption is defined as the sum of natural gas consumption and liquefied petroleum gas (LPG) consumption for the purposes of cooking, water heating, and space heating. In general, the methodology is designed to produce county consumption estimates for each use by fuel type using algorithms based on the annual heating degree days, the number of occupied dwelling units using gas for cooking or water heating fuel, and the median number of rooms per dwelling. County estimates are normalized with published data and then combined to produce the final county estimates for natural gas and LPG.

Wood--Residential wood consumption is estimated by updating published State figures with annual regional data and then allocating to the county level based on the number of dwelling units which reported heating with wood in each county. Emission factors for woodstoves and fireplaces obtained from AP-42 are weighted based on the proportions of wood burned in woodstoves and in fireplaces. Weighting is accomplished by performing a series of calculations on computed wood consumption estimates which include the following steps: (1) estimating the number of stoves based on shipments and imports, (2) calculating an obsolescence rate to determine the total stove inventory in current use, and (3) determining the stove population in primary and secondary use based on the number of dwellings in the county. Stove efficiency is also taken into account.

3.2.2.2 Commercial and Institutional Fuel

Area source emissions from fuel use by commercial and institutional sources consist of emissions from all fuel burned in stationary sources that are not included under residential sources, industrial sources, power plants, or commercial point sources. Important commercial/institutional area sources are hospitals, hotels, laundries, schools, and universities.

Activity levels are estimated for anthracite coal, bituminous coal, distillate oil, residual oil, and natural gas using the methodology which is described in the Anthracite Coal section for Residential Fuel.

County commercial/institutional area source activity levels for anthracite coal, bituminous coal, distillate oil, residual oil, natural gas, and LPG are calculated for five major subcategories, namely, hospitals, hotels, commercial laundries, schools, and universities. The methodology obtains consumption data for each fuel type in the following steps: (1) estimating total county fuel consumed by the five identified commercial subcategories using algorithms based on employment, annual heating days, bed counts, and number of rooms; (2) distributing total fuel consumption to each fuel type by the five subcategories according to State proportion of occupied residential units using each type for space heating; (3) determining State total commercial area source fuel consumption, taking into account point source emissions; (4) normalizing State estimates against published State consumption; and (5) determining and allocating county consumption by "other" commercial categories. Emission factors are taken from AP-42.

3.2.2.3 Industrial Fuel

Area source emissions generated by the industrial sector which are not accounted for by point source categories are estimated by the following methodology. County industrial fuel consumption for bituminous coal, distillate oil, residual oil, and natural gas is calculated. This step is accomplished by adjusting county area source employment figures for SIC categories 20 through 39 by a fuel intensity factor determined by dividing the State consumption of fuel for each SIC category by the respective State employment. County values for fuel consumption are summed and then normalized with State-published values for respective fuel types.

3.2.3 Mobile Sources

The following section discusses methodologies for activity level and emission factor estimation for the following five major categories: Highway Vehicles, Off-Highway Vehicles, Railroad Locomotives, Aircraft, and Marine Vessels.

3.2.3.1 Highway Vehicles

For the purpose of calculating emissions, NEDS disaggregates highway motor vehicles into four categories on the basis of use and gross vehicle weight. Light duty gasoline vehicles are defined as gasoline-powered passenger vehicles weighing 8500 pounds or less. Light duty gasoline trucks include gasoline cargo vehicles weighing 8500 pounds or less. Heavy duty vehicle categories separate diesel and gasoline-powered trucks and buses weighing more than 8500 pounds. Motorcycles, light duty diesel vehicles, and light duty diesel trucks are assumed to contribute minor emissions relative to the four categories above.

Fuel consumption and average fuel efficiencies are used to determine vehicle miles traveled (VMT) for four average speed classes to reflect road usage, namely, limited access roads (55 mph), rural roads (45 mph), suburban roads (35 mph), and urban roads (19.6 mph). At the present time, NEDS calculates emissions for limited access roads, rural roads, and urban roads. Each speed class includes the following Federal Highway Administration (FHWA) assigned functional classes:

Limited Access Roads (55 mph)	Rural and Urban Interstate Rural and Urban Other Principal Arterials Other Freeways and Expressways Rural and Urban Minor Arterials
Rural (45 mph)	Rural Major Collector Rural Minor Collector Rural Local
Urban (19.6 mph)	Urban Collector Urban Local

Emission factors in grams per mile obtained from the execution of the EPA MOBILE3 emission factor model are applied to determine county-level emissions for the vehicle types and speed classes described above.[13] County-specific emission factors for each vehicle class are computed with standard MOBILE3 inputs and default values for most fleet and travel variables. County-specific inputs include vehicle registration distributions, representative annual average temperatures for each State, local inspection/maintenance program characteristics and local VMT per speed class data. For California, MOBILE3 is run with modified basic exhaust emission rates by model year to reflect California emissions standards.

For highway vehicles, activity levels include fuel consumption by fuel type for each vehicle type, and speed-class-specific annual VMT, as discussed for each vehicle type below.

Light Duty Gasoline Vehicles (LDGV)/Light Duty Gasoline Trucks (LDGT)--County use of gasoline by LDGV and LDGT is obtained by subtracting county estimates of gasoline consumed by heavy duty gasoline vehicles (computed as described below) from the total county consumption. Total gasoline consumption reported for each State is allocated to counties by one of two methods, depending on the availability of State-submitted data for vehicle miles traveled in each county. For States for which county-level-measured VMT data are available, the total State consumption is distributed to counties based on the proportion of county to State VMT totals. For States which do not report annual VMT by county, State consumption is allocated by the number of cars and trucks weighing less than 6000 pounds registered in each county, adjusted by an index of rural/urban miles per vehicle. The light duty vehicle consumption estimate is then broken down into separate estimates for LDGV and LDGT based on registration data.

County consumption estimates for each vehicle group are then converted to total vehicle miles traveled using fuel efficiency figures in miles per gallon. Total VMT for each vehicle type are then allocated to each of three speed classes (limited access roads, rural roads, and urban roads), according to the miles of each road type constructed in the county relative to the miles of each type constructed in the State.

Heavy Duty Gasoline Vehicles (HDGV)--County gasoline consumption by heavy duty vehicles is determined by calculating county estimates of gasoline consumed by three truck weight classes and institutional buses. For trucks, county truck registrations for each weight class are multiplied by the average annual miles traveled by each weight class in each State and divided by the national average weight class fuel efficiency. State gasoline consumption by institutional buses is calculated using State bus registrations and average gasoline consumption (gallons per year), and is then allocated to counties by current county population. County-level truck consumption estimates are multiplied by average fuel efficiencies and summed to yield total State VMT for HDGV. Total State HDGV VMT are allocated to county speed classes based on the county miles of each speed class.

Heavy Duty Diesel Vehicles (HDDV)--Much of the fuel consumption of HDDV is accrued outside the county of registration. To account for this behavior, the methodology makes separate HDDV fuel consumption estimates for long-range travel and short-range travel. Published State consumption is allocated to the county level on the basis of total, out-of-state, and local VMT, using survey data on annual miles traveled and percentage of the miles traveled outside the State for diesel trucks over 8500 pounds.

Long-range VMT estimates for each State are summed to form a national HDDV long-range VMT pool. The national long-range VMT pool is allocated to counties by estimated county fractions of total National Network mileage. Short-range VMT are allocated to the county level on the basis of truck registrations.

Short-range VMT and long-range VMT are then totaled for each county and multiplied by the average fuel efficiency to obtain fuel consumption by HDDV. Each county's long-range HDDV VMT are assumed to occur on limited access roads; short-range HDDV VMT are divided equally between rural and urban roads.

3.2.3.2 Off-Highway Vehicles

Off-highway vehicles fall into six general categories: farm equipment, construction equipment, industrial equipment, motorcycles, lawn and garden equipment, and snowmobiles. Gasoline is consumed by all six categories, while diesel fuel is utilized only by farm equipment, construction equipment, and industrial equipment.

Emission factors for all gasoline and diesel off-highway vehicles are taken from AP-42, except for motorcycle emission factors, which are estimated by the MOBILE2 model. Separate reactivity profiles for gasoline and diesel fuel are used to estimate the reactive portion of total VOC emission estimates. All off-highway emission factors are based on fuel consumption. Consumption estimation methodologies are described for each vehicle category and fuel type below.

Farm Equipment--To estimate State fuel consumption by farm equipment, consumption values are calculated separately for farm tractors, combines, motorized balers, forage harvesters, and general purpose large utility engines. Consumption by fuel type is calculated using State populations for each type of equipment, average annual usage (hours per year), and average hourly consumption by fuel type per unit (gallons per hour). For diesel fuel, the sum of the estimated fuel use for all subcategories is normalized to agree with published State totals for agricultural diesel fuel use. Total State gasoline and diesel fuel consumption is then allocated to the county level according to the ratio of county tractor population to State tractor population.

Construction Equipment--National gasoline consumption for construction equipment is estimated by OAQPS, while published national totals are available for diesel fuel. National consumption of each fuel is apportioned to States according to total non-building construction employment in each State. State totals for diesel fuel are normalized to agree with DOE published totals for construction equipment. County consumption of fuel is then allocated from State construction consumption on the basis of county population.

Industrial Equipment--For industrial equipment, national fuel use figures (obtained as described for construction equipment) are apportioned to counties according to relative differences between combined county employment and combined national employment in the manufacturing, mining, and wholesale trade industries. State totals for diesel fuel are normalized to agree with DOE fuel use statistics.

Motorcycles--County-level gasoline consumption is estimated with an algorithm based on population, State motorcycle registrations, average annual usage, and average fuel consumption rate. The algorithm separates off-road and combined use motorcycles, and weights the distribution of the two types according to regional variations. Emission factors are calculated using data representing uncontrolled emissions in the EPA MOBILE2 model.[14]

Lawn and Garden Equipment--National consumption of gasoline by lawn and garden equipment is estimated by NADB and allocated to individual counties based on the number of single-unit dwelling structures, the number of freeze-free days annually, the fraction of national snow zone population in the county, snowthrower fuel consumption rate, average snow removal rate, and county snowfall.

Snowmobiles--County consumption of gasoline by snowmobiles is derived from the OAQPS-established national snowmobile gasoline consumption levels, and allocated on the basis of estimated county snowmobile population. Snowmobile population is based on algorithms relating the percent of State snowmobiles used in the county to population and snowfall, and taking into account the impact of population density on snowmobile usage.

3.2.3.3 Railroad Locomotives

This category includes fuel utilized by railroad locomotives and fuel used by railroad stations and workshops for space heating. The latter fuel consumption has been included primarily because it is difficult to separate from total railroad fuel use and is considered minor compared to locomotive consumption. The emission factors for railroad fuel use are taken from AP-42. The primary fuel consumed by railroad locomotives is distillate oil (diesel fuel). Published State consumption of diesel fuel by railroad locomotives is allocated to the county level on the basis of current population distribution.

3.2.3.4 Aircraft

Emissions estimates for aircraft are divided into three categories: civil aircraft, commercial aircraft, and military aircraft. Estimates of aircraft landing and take-off cycles (LTOs) by county, based on operation records from county airports or aircraft registration data, are multiplied by emission factors based on LTOs to obtain emissions estimates.

Weighted average emission factors are computed for each type of aircraft within each aviation category. In some categories, flying hours are used as a unit of measure, under the assumption that the number of flying hours is proportional to the number of LTOs. Emission factors are then combined using aircraft type population data to form one factor for each pollutant.

Military and Civilian Aircraft--Initial emission factors are averaged and weighted by usage and population data for six aircraft types. Emission factors for each aircraft type are taken from AP-42.

Commercial Aircraft--Emission factors for commercial aircraft are calculated separately for air taxi and commercial service. Air taxi emission factors are population-weighted averages of AP-42 emission factors for turbojets, turboprops, and piston planes. Commercial service aircraft emission factors from AP-42 are updated and weighted using the previous year's NEDS data on LTOs and population data. The number of operations is estimated using the number of aircraft in service for nine plane types. The resulting values are compared with reported values obtained from the Federal Aviation Administration (FAA). The weighting factors are applied to the emission factors to produce an average for all plane types.

3.2.3.5 Marine Vessels

Marine vessel categories include distillate oil (diesel) vessels, residual oil vessels, and gasoline vessels. Consumption methodologies and emission factor derivation are presented for each category below.

The diesel vessel category includes large cargo and passenger ships, oil tankers, tugboats, and other steamships and motorships that are known to consume distillate oil. Estimates of county-level fuel consumption were originally based on numbers, types, and sizes of ships, and on time spent in port and underway. Consumption by vessels at ports was assigned to the port counties where data were available. The remaining fuel consumption was distributed to ports and waterways according to tonnage handled. Estimating current consumption of distillate oil by marine vessels requires the updating of previous county estimates using DOE State vessel fuel use data, excluding fuel used by ships outside the U.S. continental limits.

The residual oil vessels category includes large cargo and passenger ships, oil tankers, and tugboats. Historic county-level residual oil consumption estimates were based on the number, types, and sizes of ships, and on time spent in port and underway. Consumption by vessels at ports was assigned to the port counties where data were available. The remaining fuel consumption was distributed to ports and waterways according to tonnage handled. Current consumption estimates required the updating of previous county estimates with State-level DOE data on residual oil use by bunkering vessels, excluding fuel used by ships outside the U.S. continental limits.

For distillate oil vessels, emission factors are the weighted averages of AP-42 factors for commercial diesel motorships and steamships. For residual oil vessels, emission factors are the weighted average of AP-42 emission factors for commercial residual oil motorships and steamships. For both diesel and residual fuels, the weighting procedure uses the following assumptions.

Commercial vessels include 75 percent motorships and 25 percent steamships. Commercial steamships spend 80 percent of the time hotelling and 20 percent under full power. Diesel steamships spend 20 percent of the time under auxiliary power and 80 percent underway.

State gasoline vessel fuel consumption is derived from State boat registration (inboard and outboard), and average fuel consumption for each boat type. State consumption is then allocated to counties according to county inland water area, coastline, and the number of warm months suitable for recreational boating activities. Average weighted emission factors for gasoline vessels are based on inboard and outboard motorboat registrations. Weighting accounts for higher fuel consumption per hour of operation by inboard motors.

For all vessel types, VOC emission factors are adjusted to reflect appropriate species profiles, and efforts are made to exclude operations conducted outside the continental U.S.

3.2.4 Solid Waste Disposal

The area source category for solid waste disposal includes on-site refuse disposal activities by residential, commercial/institutional, and industrial sectors. In this section, emissions from the disposal practices of open burning and on-site incineration are discussed separately. Solid waste generation in hundreds of tons is used as a measure of activity level.

3.2.4.1 On-Site Incineration

For the purposes of determining the amount of solid waste generated, on-site incineration is defined as disposal in a small incinerator, encompassing the following types of disposal units: backyard burners; industrial incinerators; and incinerators used by food and department stores, hospitals, and schools. Since large municipal incinerators are usually classified as point sources, emissions resulting from disposal in this type of incinerator have not been included in this category. The quantity of solid waste generated by each sector was estimated for the base year 1976 using population statistics and per capita generation factors for each EPA region.

Since 1976, the previous year's estimates of waste generated by each sector have been updated each year according to the relative national percentage increase or decrease in the amount of waste generated (or incinerated) by NEDS point sources in each respective sector. For the commercial/institutional and industrial sectors, NEDS calculations use the annual increase or decrease in waste incinerated by SCC point source categories within each sector. The annual residential update factor is based on engineering judgment and calculations by NADB. County allocation is based on population.

Adjustments are made to county estimates based on information about specific point sources and data submitted by States. If a number of on-site incinerators have been identified as point sources, it might be appropriate to reduce or eliminate area source estimates. Also, it is important to note that State estimates of waste generated replace the extrapolated data for the year they are submitted. Submitted data are then annually updated by the above method using the relative percentage increase in waste generated. Emission factors for intermediate-size incinerators from AP-42 are used for all on-site incineration.

3.2.4.2 Open Burning

For the purposes of estimating open burning practices, the term "open burning" refers to uncombined burning of wastes such as leaves, landscape refuse, and other rubbish. Large open burning dumps are usually included under point sources.

The quantity of solid waste burned is computed by updating the previous year's waste generation for each sector in a manner analogous to updates for On-Site Incineration. The update factor is determined by engineering judgment. Estimates of the quantity of solid waste burned by point sources in the most recent year are obtained from the NEDS point source data. County allocation is based on population.

The emission factors for open burning of refuse and organic materials are taken directly from AP-42.

3.2.5 Miscellaneous Area Sources

Area sources which are not defined by Stationary Sources, Mobile Sources, or Solid Waste categories are compiled in the Miscellaneous Area Sources category. Although total emissions from each source are relatively small compared to those from the three major categories, emissions from each miscellaneous category may be significant because of size, geographic distribution, or periodic intensity over time.

3.2.5.1 Evaporative Losses From Gasoline Marketing

This source category covers evaporative losses of volatile organic compounds from gasoline marketing operations, such as filling losses from loading underground storage tanks at service stations, and spillage and filling losses from filling automobile tanks. Losses from refineries and bulk distribution terminals are excluded from this category, because emissions from refineries and terminals are assumed to be accounted for in point source categories and in Additional Area Sources. Emissions are calculated by multiplying emission factors by the activity level for this category, measured by retail gasoline sales. Retail sales of gasoline include all sales of gasoline for highway, marine, and aviation use, and for use by the construction equipment, industrial equipment, and farm equipment off-highway subcategories. County retail gasoline sales are used directly when reported by States. For counties for which retail sales of gasoline are not compiled, sales to the above user categories are estimated separately and summed to generate total county sales.

State retail sales of gasoline for highway and marine use are allocated to each county according to the county's proportion of the statewide gross dollar receipts from gasoline service stations. Published State aviation retail sales of gasoline are allocated to the county according to the total LTO cycles in the county for each of the military, civilian, and commercial aircraft categories.

County retail sales of gasoline for off-highway sources are assumed to be the same as the consumption derived in the activity levels section of Farm

Equipment, Construction Equipment, and Industrial Equipment in Off-Highway Sources (3.2.3.2).

Emission factors for gasoline marketing are obtained from AP-42, weighted by an assumed distribution of types of filling practices used.

3.2.5.2 Evaporative Losses From Organic Solvent Consumption

Area source evaporation from organic solvent usage is divided into six major categories: dry cleaning operations, degreasing operations, surface coating application operations, printing, rubber and plastics, and other miscellaneous uses. In each category, usage of specific solvents is identified and enumerated to compute total solvent usage in tons per year. Eventual evaporation of all solvents is assumed so that solvent usage is equivalent to VOC emissions.

The methodology for allocating organic solvent consumption by county consists of apportioning national consumption of nineteen primary solvent groups by major user category according to county population or user category employment data. User categories are listed in Table 3-3. Two of the major user categories, Surface Coatings and Other Uses, are further classified into subcategories as shown. Table 3-4 contains a list of the primary solvent groups used to determine losses from organic solvent consumption. The category "Special Naphthas" includes the aliphatic naphthas such as V. M. & P. naphthas, Stoddard solvents, rubber solvents, and mineral spirits.

National consumption of the primary solvent groups is distributed to each of the user categories according to the user category's percent of total solvent consumption. Percentage usage obtained from published sources is compiled for each user category. National area source solvent use estimates are determined by subtracting point source solvent use or emissions for each user category from total solvent use for each user category.

County consumption for each solvent group and user category is then computed by allocating calculated national area source consumption on the basis of county area source employment in applicable SICs (see Table 3-3) or by population. Area source employment is determined by subtracting point source employment from total county employment for each SIC category. To reflect

TABLE 3-3. AREA SOURCE ORGANIC SOLVENT USER CATEGORIES

User Categories	Population or Employment Data by SIC Used For County Allocation
Surface Coatings	
Trade Paints	County Population
Auto Refinishing	7535 (Paint Shops)
Automotive	371 (Motor Vehicles)
Wood Furniture and Fixtures	25 (Furniture and Fixtures)
Metal Furniture and Fixtures	25 (Furniture and Fixtures)
Metal Containers	34 (Fabricated Metal Products)
Sheet Strip and Coil	34 (Fabricated Metal Products)
Appliances	35 and 36 (Machinery, Electrical Equipment and Supplies)
Machinery and Equipment	
Paper	26 (Paper and Allied Products)
Factory-Finished Wood	243, 244 (Millwork, Plywood-Related Supplies, Wooden Containers)
Transportation (Non-Auto)	37 (Transportation Equipment) Less 371 (Motor Vehicles) and 373 (Shipbuilding Repair)
Electric Insulation	36 (Electrical Equipment and Supplies)
Other, Exterior, Interior	19-39 (Total Manufacturing)
Marine	373 (Shipbuilding and Repair)
Degreasing	34-39 (Metal Products, Machinery, Transportation Equipment, Instruments, Miscellaneous)
Dry Cleaning	2 x 7216, Plus 7215 and 7218 (Dry Cleaning and Combination with Wet Laundering)
Printing	264, 265, and 27 (Paper Products, Containers, Printing and Publishing)
Rubber and Plastics	30 (Rubber and Plastics)
Other Miscellaneous Use	1/2 of 19-39 Employment + 1/2 County Employment

TABLE 3-4. AREA SOURCE ORGANIC SOLVENTS

Special Naphthas
Perchloroethylene
Ethanol
Trichloroethylene
Isopropanol
Acetone
Glycol Ethers
Cyclohexanone
Methyl Ethyl Ketone
Ethyl Benzene
Propylene Glycol
Methanol
Butyl Acetate
Ethyl Acetate
Butyl Alcohols
Methyl Isobutyl Ketone
Monochlorobenzene
o-Dichlorobenzene
p-Dichlorobenzene

unequal solvent use between establishments within SIC groups, consumption is multiplied by a factor which compares the number of individuals in the county in each area source user category to the number of individuals in the nation in each area source user category. County consumptions of all solvent types are then summed to yield a total county consumption.

3.2.5.3 Unpaved Roads

Vehicle traffic over unpaved roads, parking areas, and recreational areas generates fugitive dust emissions which are estimated in NEDS. Primary factors which affect the amount of dust generated are vehicle speed, surface type, wind speed, surface moisture, and type of vehicle. The activity level (in vehicle miles traveled) is calculated using county population and mileage of unpaved roads. The emission factor is derived using an equation in AP-42.

3.2.5.4 Unpaved Airstrips

Unpaved airstrip emissions are affected by the same primary factors as unpaved roads. Fugitive emissions from unpaved airstrip use are measured by annual landing-take off (LTO) cycles on airstrips made of dirt, sand, gravel, or gravel pavement, excluding airports with no based aircraft, airports no longer in operation, heliports, and seaplane bases in each county. The activity level estimate derived for each county in NEDS is multiplied by an adjusted emission factor from AP-42 to obtain a particulate emissions estimate.

3.2.5.5 Forest Wildfires

Each year emissions are generated by forest wildfires covering large tracts of forested land. For this category, emissions estimates are generated by multiplying the number of acres burned per county by a fuel loading factor and emission factors from AP-42. VOC emissions are adjusted to include only reactive species by assuming 79.9 percent by weight of total hydrocarbons are reactive. Since 1974, the NEDS wildfire activity level for each county from the previous year has been updated with wildfire statistics from the U.S.

Forest Service. Regional fuel loading factors in tons per acre for each EPA Region from AP-42 are applied to State averages within each Region to yield tons consumed.

3.2.5.6 Managed Burning

Managed burning activities include slash burning and prescribed burning. In slash burning operations, wastes from logging operations are burned under controlled conditions to reduce fire hazard and remove brush considered to host destructive insects. Prescribed burning is used as a forest management practice to establish favorable seed beds, remove competing underbrush, accelerate nutrient cycling, control tree pests, and contribute other ecological benefits.

For this category, emissions estimates are generated by multiplying the number of acres burned in each county by a fuel loading factor and the emission factor for each pollutant. Original State estimates of acreage consumed by both managed burning techniques were determined for the NEDS inventory year of 1974. Individual State officials and the U.S. Forest Service were contacted to provide estimates of acreage burned, burning technique, and fuel loading ratios. The 1985 NAPAP Emissions Inventory utilizes State data generated for 1974 which were allocated to the county level according to forest acreage per county, as obtained from contact with local officials or State land usage maps. If not provided, fuel loadings for slash burning and prescribed burning are assumed to be 75 tons per acre and 3 tons per acre, respectively. Particulate and CO emission factors are obtained from the Source Assessment.[16] SO_2 and NOx emission factors are taken directly from AP-42.

3.2.5.7 Agricultural Burning

This miscellaneous area source category estimates emissions from agricultural burning practices routinely used to clear and/or prepare land for planting. Specific operations include grass stubble burning, burning of agricultural crop residues, and burning of standing field crops as part of harvesting (e.g., sugar cane).

Emissions estimates are generated by multiplying the number of acres burned in each county by a fuel loading factor and the emission factor for each pollutant. The original estimates for 1974 measured activity level in terms of acres burned per State. It is assumed that the total quantity of agricultural products burned in 1974 is the same quantity which will be consumed by fire each year. If no specific crop data were available, it was assumed that the number of acres burned annually is divided equally between sugar cane and field crops. Emission factors are taken from the Procedures Document for Development of National Pollutant Emissions Trends Reports[15] and AP-42.

3.2.5.8 Structural Fires

Structural fires have been included in NEDS because building fires have been linked to short-term emissions of air contaminants. The activity level for this category, measured by the total number of fires per county, is multiplied by a loading factor and an emission factor to obtain emissions estimates. In the absence of county-level data, a national average of four fires per 1,000 population is assumed to occur each year.[15] Estimates of the material burned are obtained by multiplying the number of structural fires by a fuel factor of 6.8 tons of material per fire.[15] Emission factors are taken from the OAQPS Technical Tables.[17]

3.2.6 Additional Area Sources

The 1985 NAPAP Emissions Inventory will provide detailed county level VOC emissions estimates for additional area sources which previously have not been included in the NEDS area source categories. This section presents methods which have been developed for many categories which have been traditionally considered point source categories, such as Bakeries and Synthetic Fiber Manufacturing. These categories were included to reconcile the difference between the total emissions reported in the National Air Pollutant Emissions Estimates 1940-1984[17] and the emissions already accounted for by the NEDS point source data files. The remaining categories such as Publicly-Owned Treatment Works (POTWs) and hazardous waste Treatment, Storage, and Disposal Facilities

(TSDFs) have been included due to the difficulty of measuring emissions from specific points within these categories (e.g., aeration basins). Because the additional categories are believed to generate significant VOC emissions, existing methodologies and data used by NEDS have been improved to provide accurate emissions estimates.

In this section, methodologies for estimating VOC emissions are presented for the following area sources: POTWs and hazardous waste TSDFs; fugitive emissions from synthetic organic chemical manufacturing; bulk terminals and bulk plants; fugitive emissions from petroleum refining operations; process emissions from bakeries, pharmaceutical, and synthetic-fiber manufacturing; crude oil and natural gas production fields; and cutback asphalt paving operations.

For most categories, national VOC emissions are allocated to the county level to produce county VOC emissions estimates. Activity levels, emission factors, and control efficiencies are used to determine emissions for the remaining sources.

3.2.6.1 Publicly-Owned Treatment Works (POTWs)

The published national VOC emissions estimate for the worst case scenario for unacclimated treatment systems was selected for use in the calculation of county VOC emissions in the 1985 NAPAP Emissions Inventory. Because research on VOC concentrations in POTW influents and effluents indicates that the removal mechanisms for these pollutants are relatively constant and only a percentage of incremental loadings is removed by POTWs, the national VOC emissions estimate for unacclimated treatment systems is allocated to the county level based on the percentage of industrial flow per county. To eliminate double counting, emissions accounted for by point source categories are subtracted from the national emissions estimate before county allocation. The total VOC emissions from POTWs for the nation are estimated in the EPA Domestic Sewage Study.[18]

3.2.6.2 Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDFs)

National VOC emissions estimates are developed using facility-specific process descriptions, waste characterization and quantities, and process-specific emission factors.[19] Emissions from all TSDFs in the U.S. are summed at the county level to form the national emissions estimates. Emissions at a TSDF are defined as the total VOCs emitted by all plant processes; emissions from each plant process are calculated as the product of the quantity of a specific waste handled and a process-specific emission factor. To eliminate double counting, emissions accounted for by point source categories are subtracted from the county-level emissions estimate.

3.2.6.3 Fugitive Emissions from Synthetic Organic Chemical Manufacturing

The fugitive emissions from synthetic organic chemical manufacturing are estimated using OAQPS estimates of national emissions from the manufacture of petrochemicals. Assuming that the potential for fugitive emissions (i.e., the number of pumps, valves, flanges, etc.) increases with the number of employees, the national VOC emissions are allocated to specific counties based on the ratio of the county to national employment in SIC 2869 (Industrial Organic Chemicals - Not Classified).

Currently, NEDS point source entries under several Source Classification Codes (SCCs) already account for a portion of fugitive emissions, including 3-01-800 (General Processes-Fugitive Leaks), 3-01-888 (Fugitive Emissions-Not Classified), and many chemical production-specific SCCs designated as Fugitive Emissions: General. The total VOC emissions for these SCCs are summed by county and then subtracted from the national emissions estimates. If a county has greater point source VOC emissions reported in NEDS than the overall emission level allocated from the national fugitive VOC emissions estimate, it is assumed that the fugitive VOC emissions for area source emission levels are adequately represented by point source VOC emissions data reported in NEDS. The national sum of all negative emissions is reallocated to the counties exhibiting positive emission levels based on the relative proportion of employment for SIC 2869 located in each county.

3.2.6.4 Bulk Terminals and Bulk Plants

Current methodology uses national VOC emissions estimates for gasoline bulk terminals and bulk plants based on total annual throughput and assumes that control is negligible at bulk plants. The national VOC emissions estimate is allocated to the county level based on the county employment in SIC 5171. The VOC county emissions totals for the point source data files for SCC 4-04-001 (Bulk Terminals) and SCC 4-04-002 (Bulk Plants) are then subtracted from the portion of the corresponding national VOC emissions estimate. Negative emissions are reallocated to the counties as previously described, using employment data for SIC 5171.

3.2.6.5 Fugitive Emissions from Petroleum Refinery Operations

Annual national VOC emissions estimates for petroleum refinery operations have been developed by OAQPS using capacity or production data. Under the assumption that these national VOC emissions estimates represent the sum of the fugitive and point source emissions for refinery processes, fugitive emissions are quantified by subtracting the total county point source VOC emissions of SCC categories 3-06-004 through 3-06-88 (Refinery Processes, excluding process heaters and catalytic cracking units) from the total emissions estimated for petroleum refinery processes in each county. National emissions data are allocated to each county based on refinery capacity. Negative emissions are reallocated to counties as previously described, using refinery capacity data.

3.2.6.6 Process Emissions from Bakeries

Annual national VOC emissions estimates for bakery operations are allocated to each county based on the county employment census data for SIC categories 2051 and 2052. Total county point source VOC emissions for SCC 3-02-032 (Bakeries) listed in NEDS are subtracted from the national VOC emissions estimate allocated to each county. Negative emissions are reallocated to counties as previously described, using employment data for SIC categories 2051 and 2052.

3.2.6.7 Process Emissions from Pharmaceutical Manufacturing

Annual national VOC emissions estimates from pharmaceutical manufacturing operations developed by OAQPS are allocated to specific counties based on the county employment census data for SIC category 2834. Total point source VOC emissions for SCC 3-01-060 (Pharmaceutical Preparations) listed in NEDS for each county are subtracted from the national VOC emissions estimate allocated to each county. Negative emissions are reallocated to counties as previously described, using employment data for SIC 2834.

3.2.6.8 Process Emissions from Synthetic-Fibers Manufacturing

The annual national VOC emissions estimate from synthetic-fibers manufacturing operations is allocated to the county level based on the combined county employment for SIC categories 2823 and 2824. NEDS point source VOC emissions for SCC 3-01-024 (Synthetic Organic Fiber Production) and 3-01-025 (Cellulosic Fiber Production) for each county are then subtracted from the national emissions estimate allocated to each county. Negative emissions are reallocated to counties as previously described, using employment data for SIC categories 2823 and 2824.

3.2.6.9 Crude Oil and Natural Gas Production Fields

Annual national VOC emissions estimates for crude oil and natural gas production developed by OAQPS are distributed to the State level in proportion to the volume of State annual production. The State VOC emissions are then allocated to specific counties based on county employment for SIC 1310. VOC emissions for these sources currently accounted for in NEDS point source data files for SCC 3-10-001 (Crude Oil Production) and SCC 3-10-002 (Natural Gas Production) are subtracted from the estimates. If point source emissions exceed the total emissions estimates, then negative emissions are reallocated to counties as previously described, using employment data for SIC 1310.

3.2.6.10 Cutback Asphalt Paving Operations

State VOC emissions for cutback asphalt paving operations are calculated by multiplying an emission factor by the activity level, measured in total quantity of cutback asphalt sales. The State emissions totals are then allocated to specific counties based on employment for SIC 1611. The VOC emission factor is based on the weight of asphalt used, assuming complete evaporation of all organic solvents used in paving operations.

3.3 NONCRITERIA POLLUTANTS

3.3.1 Noncriteria Pollutant Inventory

The 1985 NAPAP Emissions Inventory of anthropogenic sources focuses on three NEDS criteria pollutants: SO_2, NO_x, and VOC. Although SO_2, NO_x, and VOC are considered the primary precursors of acid deposition, other pollutants are also regarded as significant. Four non-criteria pollutants included in the 1985 Emissions Inventory are primary sulfates (SO_4^{2-}), hydrogen chloride (HCl), hydrogen fluoride (HF), and ammonia (NH_3). Estimates for these pollutants are not supplied by the States, as there is no extant reporting structure. Historically, EPA has not collected emissions data on these pollutants, and neither EPA nor the States have the capability to develop source-specific inventories. Therefore, this sector of the 1985 NAPAP Emissions Inventory represents a unique effort by EPA to develop emission factors and make emissions estimates. Estimates for these four noncriteria pollutants were made at the request of the NAPAP modeling community and the Western Governor's Association Acid Rain Study Group. In order to create as comprehensive a data base of acid rain precursors as possible, estimates for the pollutants were made and have been included in the report. Due to a lack of standardized, reliable sources of data for these pollutants, EPA developed emission factor reports for these pollutants.[20,21,22,23] These reports analyzed existing data for a variety of source categories and recommended emission factors appropriate for use in the 1985 NAPAP Emissions Inventory. These factors were rated qualitatively, in a manner similar to the way that AP-42 factors are rated.

These documents may be referenced for further information on these factors.

These emission factors and resulting emissions estimates represent the first time that a comprehensive emissions inventory for primary sulfates, hydrogen chloride, hydrogen fluoride, and ammonia has been attempted by EPA. These estimates should not be considered to be as accurate or reliable as the criteria pollutant inventory. The estimates were not generated or reviewed by the States or the sources, and although operating rate data were provided by the States, errors in the data will affect these emission estimates.

Emissions estimates for noncriteria pollutants from existing NEDS point sources were developed using SCC-level emission factors applied to NEDS process-level throughput data. Applicable SCCs were identified during review of emission factors. It should be emphasized that, in contrast to the criteria pollutant estimates, the resulting emissions estimates are not the result of estimates made by the States.

Emissions of SO_4^{2-}, HCl, HF, and NH_3 from area sources were also estimated. Emission factors were developed to be used with the area source estimation methodologies, and these factors were combined with activity levels obtained at the county level.

Where applicable, emission factors account for control practices used within the relevant source categories. Emission factors consider average control efficiencies and prevalence of controls in a source category. Although actual emissions at the plant and point-process level will be under- or over-estimated to the extent that control practices and efficiencies deviate from the industry averages, these assumptions were necessary since there is no structure available for States to report non-criteria pollutant control devices and efficiencies to NEDS.

3.3.2 Emissions Estimation Methods

3.3.2.1 Primary Sulfates

Primary sulfate is emitted directly from emission sources as SO_4^{2-}, unlike secondary sulfate, which is derived from the atmospheric transformation of SO_2. Source categories that emit primary sulfate include external combustion, chemical manufacturing, primary metals, mineral products, and petroleum refining. Sulfate emission factors were compiled for these categories as part of the 1985 NAPAP Emissions Inventory effort (Table 3-5).[20]

Two previous programs have made assessments of sulfate emission factors: the Electric Power Research Institute's (EPRI's) sulfate regional experiment and the United States/Canada Work Group 3B. The NAPAP effort reviewed these two assessments and also took advantage of the recent acceptance of a standard sampling and analysis procedure by the source emissions measurement technical community. This method, controlled condensation sampling (CCS), is currently considered to be the most accurate approach to measuring sulfate from stationary sources. CCS-derived measurements were abstracted from the literature and primary sulfate emission factors were calculated.

Calculation of source-specific sulfate emission factors was based on a hierarchical selection process:

1) Where available, field measurements using the CCS procedure were considered as the prime data set,

2) Sulfate emissions assessments were aggregated for different point sources within the same category only if fuel composition and emissions controls were similar, and

3) Non-CCS emissions data were used only if multiple measurements produced data with minimal variation.

NEDS throughput data were multiplied by appropriate emission factors for relevant SCCs to produce process-level emissions estimates for the 1985 NAPAP Emissions Inventory.

3.3.2.2 Hydrogen Chloride

HCl is emitted from coal combustion, waste incineration, and organic chemical manufacture (Table 3-5). The primary source is coal combustion. NAPAP compiled and rated emission factors from the literature for these source categories for use with the 1980 NAPAP Emissions Inventory.[21] Emission estimates were calculated by EPA based on these emission factors and throughput data at the SCC-level for the relevant point source categories (SCCs).

TABLE 3-5. EMISSIONS SOURCES OF PRIMARY SULFATE, HYDROGEN CHLORIDE, HYDROGEN FLUORIDE, AND AMMONIA IN THE NAPAP INVENTORY.

SOURCE CATEGORY	SO_4^{2-}	HCl	HF	NH_3
Combustion				
Coal	X	X	X	X
Distillate Oil				X
Residual Oil	X			
Natural Gas				X
Wood/Bark Waste	X			
Primary Metals				
Copper	X			
Zinc	X			
Aluminum	X		X	
Iron Production	X			
Coke Production	X			X
Petroleum Industry				
FCC	X			X
TCC				X
Claus Plants	X			
Engine Compressors				X
Wood Products				
Kraft Pulp Mill	X			
Sulfite Pulp Mill	X			
Mineral Products				
Cement Manufacture	X			
Gypsum Manufacture	X			
Chemical Manufacturing				
Sulfuric Acid - Contact Process	X			
Propylene Oxide		X		
By-product HCl Production		X		
HF Production			X	
Ammonium Nitrate				X
Phosphate Fertilizer			X	
Ammonia Synthesis				X
Urea Manufacture				X
Ammonium Phosphate				X
Incineration		X		
Area Sources				
Mobile Gasoline Combustion				X
Mobile Diesel Combustion				X
Anhydrous NH_3 Fertilizer Application				X
Livestock Waste				X

3.3.2.3 Hydrogen Fluoride

The primary source of HF is coal combustion; HF is also emitted from hydrogen fluoride manufacture, the primary aluminum industry, and the phosphate fertilizer industry (Table 3-5). NAPAP compiled and rated emission factors from the literature for these source categories for use with the 1985 NAPAP Emissions Inventory.[21] Emissions estimates were calculated by EPA based on these emission factors and throughput data at the SCC-level for the relevant point source categories.

3.3.2.4 Ammonia

NH_3 is emitted in significant quantities from both point and area sources. Major anthropogenic source categories include field application of livestock wastes, beef cattle feedlots, fertilizer manufacture and use, mobile and stationary fuel combustion, ammonia synthesis, petroleum refining, waste water treatment, and coke manufacture (Table 3-5). Emission factors for the categories were developed from the literature by NAPAP.[22] AP-42 data were used to characterize emissions from fertilizer manufacture, ammonia synthesis, petroleum refining, and coke manufacture.

Before being included in the 1985 NAPAP Emissions Inventory, NH_3 emission factors developed for the inventory were compared to similar factors developed for inventories by Environment Canada, EPRI, and the National Aeronautics and Space Administration (NASA). The factors selected were deemed the most appropriate available, based on criteria concerning test method validity, and currentness and representativeness of the data.

Point source category emissions were calculated by EPA using throughput data at the SCC-level for the relevant categories. Area sources constituted the majority of NH_3 emissions; estimates were derived from activity levels specific to the category. Where no activity levels could be developed, no NH_3 estimate was made.

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SECTION 4

QUALITY CONTROL FOR POINT AND AREA SOURCE DATA

This Section describes relevant EPA quality assurance/quality control (QA/QC) policy, clarifies the use of QC for inventory data, and identifies specific EPA objectives met in order to create a comprehensive and accurate 1985 emissions inventory.

4.1 BACKGROUND

4.1.1 EPA Policy

EPA'S current QA/QC program on emissions measurements was initiated in May 1979. Detailed program requirements were issued in April 1984 under EPA Order 5360.1, "Policy and Program Requirements to Implement the Mandatory Quality Assurance Program." This order was developed to ensure that all environmental measurements conducted by EPA's Regional Offices, program offices, laboratories, contractors, and other sources resulted in data that were both scientifically valid and defensible. Valid and defensible data would include documentation of measurement precision, accuracy, representativeness, and comparability, as well as sample custody.

The stringency of these requirements varies with the use of the measurements being made. The most stringent requirements are reserved for engineering and environmental measurements that might be incorporated into EPA regulatory, enforcement, legal, or policy decisions.

Table 4-1 illustrates the elements of a typical QA/QC plan for engineering research or development projects that might be used for EPA policy decisions. Almost half of these elements (i.e., elements 3, 5, 7, 8, 10, 11) focus on topics intrinsic to environmental measurements: measurement equipment, calibration procedures, analytical procedures, data reduction, equipment performance audits, and preventive maintenance checks.

However, these elements have no counterparts in nationwide emissions inventory projects, because inventory data are almost exclusively based on emissions estimates rather than measured data. In general, the emissions data contained in emissions inventories are annual estimates that have been

TABLE 4-1. QUALITY ASSURANCE/QUALITY CONTROL ELEMENTS FOR ENGINEERING RESEARCH AND DEVELOPMENT PROJECT PLANS

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1. Project objectives and constraints
2. Project and QA/QC organization
3. Data quality objectives for measurements
4. Sampling procedures
5. Calibration procedures and frequency
6. Sample custody
7. Analytical procedures
8. Data reduction, validation, and reporting
9. Internal QA/QC checks
10. Plans for performance and systems audits
11. Preventive maintenance
12. Calculation of data quality indicators
13. Plans for corrective action
14. Plans for QA/QC reports

developed by multiplying emission factors by activity indicators such as fuel consumption, by extrapolating from short-term test data, or by using engineering judgment. Therefore, the fundamental concepts of data accuracy and QA (assessing the differences between measured and true values) do not apply to emissions inventories. The traditional QA/QC approach developed for environmental measurements such as emissions tests is not applicable to the 1985 NAPAP Emissions Inventory, where QC procedures are limited to verifying the reasonableness--as opposed to the accuracy--of the emissions inventory.

The development of QC procedures for the 1985 NAPAP Emissions Inventory is complicated further by the size of the inventory and its component data bases. For example, the anthropogenic point source data base maintained by EPA's National Emissions Data System (NEDS) contains 50 data elements for each of about 200,000 emission points--or about 66 million bytes of data. Ultimately, the 1985 NAPAP Emissions Inventory, which includes these point source data, will contain hourly emissions estimates for approximately 35 pollutant species along with the 100 area source emissions categories for each of 63,000 grid cells (each cell is a geographic area roughly 20 km square)--or about 4 billion bytes of data. For data bases of this magnitude, QC procedures must be maintained and applied on large computers.

The conceptual framework for QC procedures for the 1985 NAPAP Emissions Inventory was adapted from the QC elements developed by EPA for environmental measurements and from an EPA study identifying QA/QC approaches to emissions inventory activities.[1,2] The QC program for the 1985 NAPAP Emissions Inventory represents a pioneering effort in QC procedures for emissions inventory projects within EPA.

4.1.2 Emissions Inventory Quality Control

Table 4-2 presents eight recommended QA/QC elements for emissions inventory projects. Note that the elements in this table are similar to the eight elements which remain in Table 4-1, except that those elements germane only to environmental measurements have been deleted. These eight elements constitute the conceptual framework for the *ad hoc* EPA emissions inventory QC program that has been developed for the 1985 NAPAP Emissions Inventory. The QC

TABLE 4-2. RECOMMENDED QUALITY ASSURANCE/QUALITY CONTROL ELEMENTS FOR EMISSIONS INVENTORY PROJECT PLANS

1. Project objectives and constraints
2. Project and QA/QC organization
3. Data collection procedures
4. Data custody
5. Data validation and QA/QC checks
6. Internal data handling procedures
7. Calculation of data quality indicators
8. Plans for QA/QC reports and corrective action

loop developed for the inventory concentrates on elements four through eight in Table 4-2.

4.2 OBJECTIVES

One of the major objectives of the EPA QC effort for the 1985 NAPAP Emissions Inventory was to provide a communications process permitting systematic identification and resolution of problems identified concerning reported or missing data. Other objectives are listed below.

4.2.1 Identification of Key Data Elements and Data Quality Objectives

A basic objective of the 1985 NAPAP Emissions Inventory was to compile a comprehensive and accurate inventory of emissions and facility data for anthropogenic sources for the 1985 base year, in order to serve several needs articulated by EPA and NAPAP. Both NAPAP and EPA wanted to develop point and area source data bases with emissions estimates that were confirmed by the participating sources and States. Additionally, NAPAP planned to use the inventory developed from these data bases in an atmospheric process model which analyzes relationships between emissions and acidic deposition.

In order to ensure that the data quality objectives considered important by NAPAP and EPA received the most attention, NAPAP developed guidelines for high priority data elements and data quality objectives to help the States effectively allocate their limited staff resources. High priority data elements for the 1985 NAPAP Emissions Inventory were indicated in Table 3-1. Table 4-3 summarizes NAPAP data objectives.

The QC procedures focus on the largest point source emissions categories, e.g., electric utilities, petroleum refining, cement manufacturing, pulp and paper mills, motor vehicle coating, and iron and steel mills. In addition, QC procedures focus on several data elements that have been identified as priorities for NAPAP research, i.e., emissions estimates, unit process identifiers (source classification codes), control equipment and efficiencies, fuel and operating rate data, location, throughput, and temporal profile data. All five criteria pollutants--nitrogen oxides (NO_x), sulfur dioxide (SO_2),

TABLE 4-3. NAPAP 1985 EMISSIONS INVENTORY DATA QUALITY OBJECTIVES

	Emissions Inventory for Support of Assessment Activities	Emissions Inventory for Support of Eulerian Atmospheric Modeling
Geographic Domain	48 U.S. States, District of Columbia, and Canada	Same
Temporal Resolution	Annual/seasonal	Hourly emissions values for typical weekday, Saturday, and Sunday for all four seasons
Spatial Resolution	Coordinates for point sources; area sources at the county level in the U.S. and at the province levels in Canada; natural sources at county, State, or province level; release height	Coordinates for point sources; area sources assigned to 20 x 20 km grid cells; release height
Species	SO_2, NO_x, reactive VOC, TSP, CO	SO_2, SO_4, TSP (Ca, Mg, K, Na), CO, HCl, HF< NO, NO^2, NH_3, VOC (methane, ethane, ethylene, propane propylene, N-butane, 1,2-butane, isobutane, isobutene, trans-2 butene pentane, isopentane, 2,3-dimethylbutane, other alkenes, other alkanes, formic acid, acetic acid, other organic acids, formaldehyde, acetaldehyde acetone, other ketones, other aldehydes, xylene, benzene, toluene, ethylbenzene, other aromatics) natural emissions (S, alkaline dust, NO_x, from lightning and biota, isoprene, 4 major turpenes, NH_3)
Sources	Anthropogenic stationary sources emitting >100 tons of criteria pollutants in 1985; area source estimates for small stationary and mobile sources; natural sources	Same

volatile organic compounds (VOC), total suspended particulates (TSP), and carbon monoxide (CO)--are included in the NAPAP inventory. The point source QC methodology focuses on NO_x, SO_2, and VOC because they are expected to play major roles in the acid deposition models.

Another major objective of the point source data base QC checks was to communicate results effectively to field inventory personnel who are most knowledgeable about sources in their States. For this reason, the point source QC process for 1985 is a three-step screening process. The first step, at the field level, involves State and EPA Regional Office personnel. The second step, which occurs after the data are submitted to OAQPS/AEERL, is a search for systematic errors and omissions in the data. The third step, which takes place after the data are compiled into a preliminary NEDS file, is the return of detailed QC documents outlining any problems found with the data to the States so that they may comment and correct the data. A flow chart of the QC procedures is shown in Figure 4-1.

4.2.2 Identification of Problems in Existing State Emissions Inventories

Early in 1986, the most recent emissions inventory file for each State was examined by OAQPS/AEERL for missing high priority data items, missing estimated emissions, and any systematic errors involving invalid coding or processing (see Section 3.1.5). These reviews indicated several consistent deficiencies in the EPA data bases: emissions estimation methods were not recorded correctly, allowable emissions were reported instead of actual emissions, and blanks rather than zeros were left in the spaces for control equipment/ efficiencies to indicate no control equipment. These data problems did not necessarily reflect problems specific to the State point source data. For example, some of the data gaps resulted from incomplete translation of data from the State systems to NEDS. Subsequently, the Regions and States were able to identify many of the sources of these errors and institute corrective measures within the data collection, coding, and transfer steps. This action alerted EPA to potential problem areas for the 1985 NAPAP Emissions Inventory.

4.2.3 Standard Inventory Techniques

Establishing a common methodology at the State level for data collection, emissions estimation, and QC was an important early step in assembling an adequate and consistent data base. First, the resulting State data bases would be developed on a nationally consistent basis. Second, QC procedures could be developed to build QC directly into the data collection process, where errors could be located and corrected most efficiently. Essential elements of procedural and technical guidance were communicated to State and contractor personnel through two workshops and companion manuals (see Section 3.1.6).

4.2.4 Emissions Estimation Procedures

Emissions estimates from the States for the 1985 NAPAP Emissions Inventory are calculated estimates of actual emissions during 1985. NEDS recognizes two types of estimation procedures: one using individual source data and one using emission factors. EPA requested that States, whenever applicable, use the standard emissions estimation procedures, described in Section 3.7, and presented a hierarchy for utilization of the acceptable methods. Each method has a unique code in NEDS so that the method is documented and can be tracked over time for each emissions point.

4.2.5 Utility Quality Control Checks

Utilities represent the single largest point source category of NO_x and SO_2 emissions. For this reason, a comprehensive methodology of QC checks was developed specifically for this source category. The focus of this methodology was on complete coverage of the electric utility industry, proper classification of all electric utilities, and agreement between specific data reported to EPA and data reported to DOE.

The first part of this methodology was a review of NEDS data to identify plants that might be electric utilities. The first three digits of the SCC codes for electric utility boilers are 101 or 102. In addition, the Standard Industrial Classification (SIC) Code for electric utilities is 4911. The review identified both facilities which met these criteria and facilities which met the criteria in part but appeared to have internally inconsistent data. The utilities found in NEDS were compared to those provided by DOE. In order to ensure that all potentially large utilities were covered, all discrepancies that involved utilities expected to emit at least 100 TPY of NO_x, SO_2, or VOC were noted.

The second part of the electric utility review was a direct comparison of data elements reported by the utility plants to EPA through NEDS and to DOE through Energy Information Administration (EIA) Form 767. The NAPAP high priority data elements were of particular concern in this comparison.

4.3 THE POINT SOURCE QC LOOP

To meet the objectives of the EPA QC policy for emissions inventories, a systematic QC loop was developed involving State agencies, EPA Regional Offices, and EPA OAQPS/AEERL. Problem resolution, correction, and review entailed all three levels in a cooperative process. At each major stage in the QC process, an option existed to refer problems back to State agencies, to permit engineers closest to the sources to resolve problems. The QC loop is outlined generally below, with the components of each phase subsequently explained. Figure 4.1 provides a graphic presentation of the loop.

4.3.1 Overview of QC Loop

The QC loop begins with the States, which were responsible for the initial compiling and reporting of 1985 point source data via NEDS to EPA. States obtained emissions and other source data regarding criteria pollutant emissions directly from plants. The State role in the QC process continued throughout each step, as the option existed to refer problems or questions about the data back to the State agencies generating the data for resolution.

EPA Regional Offices then subjected the State data submittals to the NE061 edit checking program, and enlisted State help in resolving identified problems or errors in the data. OAQPS then updated the State emissions inventory data to create a preliminary NEDS point source file. As the data were corrected, a

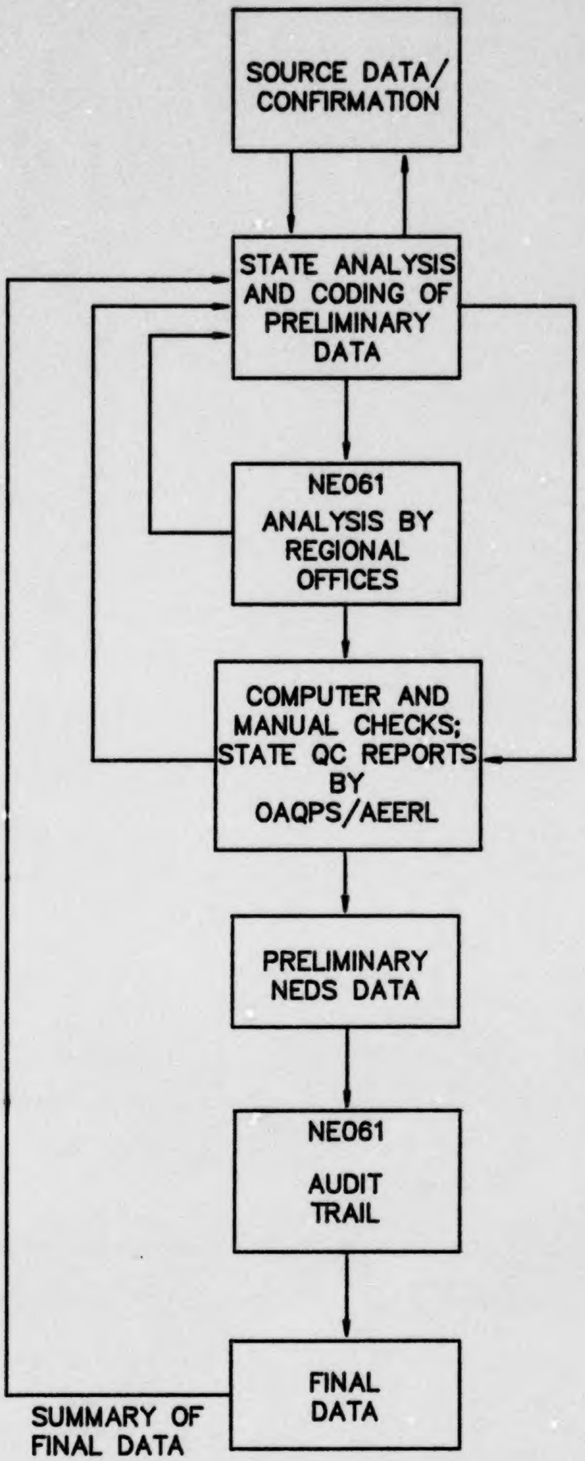
SOURCE DATA/ CONFIRMATION
STATE ANALYSIS AND CODING OF PRELIMINARY DATA
NE061
ANALYSIS BY REGIONAL OFFICES
COMPUTER AND MANUAL CHECKS; STATE QC REPORTS BY OAQPS/AEERL
PRELIMINARY NEDS DATA
NE061
AUDIT TRAIL
FINAL DATA
SUMMARY OF FINAL DATA

Figure 4.1. QC Loop for Point Source Emissions Data

computerized Audit Trail system kept track of all changes to the original State-submitted data and ensured that all identified problems had been addressed.

After the data were screened by EPA Regional Offices, they were subjected to a second set of screening procedures developed specifically for the 1985 NAPAP Emissions Inventory by OAQPS/AEERL. In this screening process, four computerized programs and two manual checks were used to indicate inconsistencies and errors in the data. The results of these programs were compiled into a six-part QC document for each State, which was sent to the State and EPA Regional Offices for corrective action or confirmation of questionable data.

After final corrections and updates to the State's emissions inventory had been made, a final review of the complete 1985 point and area source data base constituted a last step in the QC process. A check of the largest sources was made in an attempt to guarantee that all errors were detected and corrected. Inconsistencies in confirmation results and the use of NEDS-calculated emissions were also reviewed. In February 1988, each State received its final NEDS point and area source data for a final review. At this time questionable data identified in the final QC step were verified or corrected through the same channels established for the NEDS inventory. All changes were documented by the Audit Trail program.

4.3.2 State Level - Data Collection and Confirmation

Quality control (QC) of the State emissions inventory submittals proceeded in several steps. The process began with a State's submittal of 1985 emissions inventory data. For many States, this effort required contacting each major source, obtaining detailed emissions and facility data for each point within that source, obtaining confirmation of plant emissions totals, encoding the data onto NEDS forms, and checking the forms for errors. The State could run a computerized edit-checking program on the data and make appropriate corrections. Additionally, States were asked to help NAPAP resolve any questions that were identified at later stages of the QC process for sources that emitted at least 1000 tons of SO_2, NO_x, or reactive VOC.

The States then submitted their 1985 NEDS data to EPA Regional Offices. The Regional Offices broke the data down into standard NEDS subfile and card image files. If the files passed the general validity scan performed on them, they were copied to computer disk for further processing. At this point, the edit program NE061 was run on the card image file, and an error report was generated. (See Appendix B for a list of rejection and warning messages used by NE061.) The Regional Offices enlisted State assistance in resolving identified problems or errors. The Regional Offices then transmitted the emissions inventory data and confirmation status reports to OAQPS, along with a State transmittal letter describing the coverage of the inventory.

4.3.3 EPA Screening Level

OAQPS then updated the State data to create a preliminary NEDS point source file. Once the State data were in a preliminary point source file, a tape of the file was transferred to AEERL. AEERL entered the file into its data base and subjected it to a variety of QC checks, which are described in detail below. These initial checks included the NE061 edit checks to verify that problems identified by the Regions had been resolved, completeness checks for missing facilities, comparisons with State utility data submitted to DOE, and additional QC checks to identify erroneous data.

4.3.3.1 NE061 Edit Checks

The NE061 edit program creates two reports with each execution. The first report is a reject edit diagnostics report. It identifies data entries that were rejected for invalid State, Air Quality Control Region (AQCR), plant or point identifiers (IDs), Source Classification Code (SCC), action code, transaction type, or card number. These errors must be corrected by the States and the data must be resubmitted before the entries can be considered valid.

The second report is a warning edit diagnostics report. Cards identified in this report contain likely errors (certain data items missing, data items exceeding limits established in external data files, or internally inconsistent data), but are not necessarily invalid. The warning report was reviewed to identify any real errors that needed to be corrected or any important missing data items that needed to be obtained. Warning messages did not always indicate an error; however, EPA Regional Offices and States were asked to verify that inventory data flagged with warning messages for facilities emitting more than 1000 tons per year of SO_x, NO_x, and VOC were correct.

If no rejection errors or warning messages apply for a particular card image record, no message is printed. A summary is generated which includes a count of the total number of card images read, the number that passed the minimum data quality requirements, and the number that were flagged with reject messages.

4.3.3.2 Completeness Checks

After the NE061 edit checking program was run, a completeness checking procedure was performed to identify possible omissions of large sources in the 1985 State NEDS submittals. Data from the 1985 submittals were compared with data from the 1984 NEDS Large Source File and with plants listed in the Independent Completeness File. The 1984 NEDS Large Source File contains the NEDS codes, names, addresses, and emissions for plants in the current 1984 NEDS point source file emitting more than 1000 tons/year of SO_2, NO_x, or VOC. The Independent Completeness File was compiled from several reference sources including trade association publications, current industrial directories, and EPA New Source Performance Standards files.

The results of the completeness checks for each State submittal were summarized in three tables. The first table listed plants in the Independent Completeness File not found in the 1985 State submittal. The second table contained a listing of plants in the 1984 Large Source File not found in the 1985 submittal. The third table listed the 1984 NEDS-computed emissions which differed greatly from the 1985 State-submitted emissions for SO_2, NO_x, and VOC.

Other computerized and manual data checks were also run on the State NEDS submittals. These included checks for missing data and checks against standard data ranges to ensure the completeness and accuracy of the final data base, as described below.

Checks for missing data--A pre-update screening of the data was performed to check that (1) major sources emitting over 100 tons/year were not improperly deleted, and (2) plant names matched with current plant IDs to ensure that plant IDs were not changed.

The data were updated to the NEDS file and the update reports returned to the Regional Office. The update process stored the new data in NEDS and calculated emissions or apportioned reported emissions to the SCC level. The update created the Calculation Validation Report, the Update Rejection Report, and the Update Validation Report. The Calculation Validation Report identified inconsistencies in the parameters (estimation methods, emission factors, operating rates, sulfur and ash content, estimated point emissions, and SCC emissions) that were rejected because the data were incomplete (missing cards) or because the update action code (add, change, delete) was incorrect. The Update Validation Report identified some of the inconsistencies between related data items.

OAQPS/AEERL procedures include a post-edit inventory of data received. This inventory was created to determine the amount of data submitted and whether the coverage agreed with the letter from the State. Major problems such as incomplete card sets were identified by this procedure.

Checks against standard data ranges--The State NEDS inventory was edited by the NEDS edit program to identify any items outside the bounds of "reasonableness" criteria that were not resolved by the State or Regional Office. Problems for sources above the NAPAP thresholds were referred to the Regional Office and the State for resolution.

The UTM coordinates for each point source were checked against correct ranges for the county. For the sources above the NAPAP threshold, the apparent errors were referred for resolution. For all other problems, NAPAP substituted the county centroid for the coordinates.

NEDS stack, control device, control efficiency, emissions, and activity data for a given source underwent statistical checking procedures. Reported data were checked against mean values for that SIC/SCC combination. Data that fell more than two standard deviations outside the mean for that SIC/SCC were flagged for investigation.

4.3.3.3 DOE EIA-767 Utility Fuel Data Comparison

The electric utility sector is a major source of SO_2 and NO_x emissions in the U.S., contributing about two-thirds of total SO_2 and one-third of total NO_x emissions. Because this sector represents such a large portion of the total emissions for these pollutants, it was imperative that the highest possible quality data be reported to NEDS for the 1985 NAPAP Emissions Inventory. In addition to running NE061 and other computerized and manual QA checks on State NEDS submittals, EPA also used utility data submittals to the Department of Energy (DOE) for QC purposes. Since the utilities are required by Federal law to report certain information to DOE's Energy Information Administration (EIA), those items should serve as an appropriate basis for comparison with utility data submitted to NEDS.

Of particular interest for the 1985 NEDS/NAPAP Inventory were the data reported on Form EIA-767. This report includes data that are very similar or identical to data required in NEDS. Every steam electric generating plant with a total generator nameplate rating of 100 megawatts or greater is required to submit a Form EIA-767. In 1985, this group included about 500 fossil fuel-fired steam electric plants.

The EIA-767 data were compared with data received from NEDS as a QC check for utilities above the NAPAP emissions thresholds. For State or local agencies, EIA-767 could serve either to supplement the data normally collected from electric utilities or to provide a quality assurance crosscheck. Ideally, State agencies worked in cooperation with utilities in their domain to ensure that the data reported to DOE by the utility and the data reported to EPA by the State were correct and consistent with each other. At this stage in the QC process, resolution of discrepancies found by OAQPS/AEERL was likely to be less awkward and time-consuming than it would be later in the QC process. Significant discrepancies in location, stack parameters, activity levels, and emissions data were referred to the States for resolution. EPA felt that the time and effort spent by the States to work with utility companies concerning their report to EIA were more efficiently used than time spent later trying to resolve discrepancies between NEDS and EIA data.

4.3.3.4 Additional QC Checks

OAQPS applied a series of additional QC checks to the State NEDS submittals to indicate systematic errors. These checks included both computerized and manual checks, and focused on the NAPAP high-priority data items. Five checks were used: the State Emissions Summary Report, the State Fuel Summary Report, the County/Plant Emissions Report, Quick Look Reports, and the Calculation Validation Report.

The State Emissions Summary Report was used for large-scale comparisons of emissions data. It summarizes emissions data by combustion source type and fuel type, and presents total statewide emissions for NO_x, SO_2, and VOC. These totals were compared to the previous year's totals and to previous emissions trends to ensure that 1985 data were in line with past emissions totals.

The State Fuel Summary Report was used for large-scale comparison of fuel consumption data. It was compared to the 1984 State Fuel Summary Report for each combustion category and for each type of fuel. Data on fuel consumed by electric utilities were also compared to the DOE Generating Unit Reference File (GURF).[3] State consumptions of coal, oil, and gas were compared to fuel delivery data provided by DOE.[4,5,6] Generally, coal consumption by point sources should have equaled coal delivered. Oil and gas consumption by point sources should have been less than the fuel deliveries because a large portion of these fuels is consumed by area and mobile sources. During this analysis, the most frequent problem encountered was the over-reporting of fuel consumption in the NEDS submittals.

The County/Plant Emissions Report gives emissions by individual plants sorted by county. Other data fields, including year of record and location data, are also listed. This report was quickly scanned to ensure that the new data had a 1985 year of record.

NEDS can calculate emissions by multiplying the annual operating rate by an emission factor from the emission factor file. Because these emissions estimates are computer-calculated, they are not as valid as estimated emissions data entered by the State agency. The Quick Look Reports were used to identify two possible problems. First, a check was made for instances where NEDS could have calculated positive emissions for a source that reported zero emissions.

Small sources were ignored, but those with potential emissions exceeding 25 TPY of NO_x, SO_2, or VOC were noted. Second, instances in which the State requested that NEDS calculate emissions, but no emission factor existed in the emission factor file, were noted.

The Calculation Validation Report identified any instance where NEDS could not allocate emissions from the point level to the SCC level. This problem generally occurred when one of the SCCs assigned to the point had no emission factor or its operating data were missing. This scan was performed for SCCs expected to emit 25 TPY or greater of criteria pollutants. If a decrease in emissions was found during the scan of the State Emissions Summary Report, then additional information on the possible miscalculation of emissions was sought in the Calculation Validation Report, which prints out all instances where estimated point emissions differ from computed emissions by more than a factor of three.

4.3.3.5 Audit Trail

The 1985 NAPAP Audit Trail Program was designed to document all changes made to the NAPAP Emissions Inventory point source data base. The SCC-level NEDS data were used as input to this program. SCC-level data are defined as sources having unique State, County, plant, point, and SCC code combinations. All information resulting from the execution of this program was stored in an "electronic notebook" disk file.

Each record in the new version of the data base was compared to the corresponding record in the previous version of the data base. All parameters, such as stack height, flow rate, emissions estimates, etc., were checked for matching new and old values. If a match was not found for a particular source, the record was flagged and the old and new values of the parameter were printed. If a record was present in the new data base but not the old data base, the record was flagged as a new (added) record and was printed. Similarly, if a record appeared in the old data base but not in the new data base, the record was flagged as an old (deleted) record and was printed.

4.3.4 QC Reports

After NE061 edit checks, completeness checks, and other QC checks were performed on the State submittal, the results of these efforts were assembled into a State QC report. This report included the following information:

(1) the results of the NE061 edit checks for plants reported to emit at least 1000 TPY SO_2, NO_x, or VOC;

(2) emissions sorting, parameter validations, and large source completeness reports;

(3) a report showing what portion of total plant emissions were calculated, rather than reported, for plants where EPA was requested to calculate emissions from any point by using the NEDS emission factor file; and

(4) annotation of these reports to indicate, where possible, which warning messages should be investigated and resolved by States.

Once a State QC report had been assembled, OAQPS/AEERL reviewed the results of the QC checks made on each State NEDS submittal to identify specific problems in the results, such as misleading or incorrect error/warning messages, and to identify significant data quality problems revealed by the checks. After analyzing the results of this review, OAQPS made recommendations for resolution of any problems found. Appropriate modifications were then carried out to resolve the detected problems.

The QC results for each State submittal were then assembled into a formal report ("State Report") complete with explanatory notes for each section and a cover letter from OAQPS. An attempt was made to minimize the time required to generate the State Reports to fewer than 15 working days from receipt of the State submittals.

The State QC Reports were then submitted to OAQPS and sent on to the State agencies responsible for the data. The State agencies pursued QC questions and problems, corrected errors, and provided missing data items for as many sources as possible. In order to facilitate response to the State Reports, States were requested to respond to the results of the NE061 edit checks, the completeness checks, and miscellaneous QC questions on a priority basis. Based on State responses, EPA completed final updates to the State emissions inventory data submissions.

After these data updates to the State NEDS submittals were completed, a final review by each State of its final NEDS point and area source data was initiated. As part of this final review, three additional data screens were made. First, a final check of the largest sources was made to guarantee that all errors were located and corrected. In this check, the 1000 largest points for SO_2, NO_x, and VOC were identified from the NEDS point source file. (These points represent 81, 68 and 47 percent of the total point source SO_2, NO_x, and VOC emissions, respectively). The data for each point source were examined by a qualified reviewer for consistency and realistic values. In addition, other points emitting at least 500 tons per year were screened for missing stack parameters. Second, inconsistencies between State confirmation reports and NEDS emissions were identified. Third, NEDS-calculated emissions were again summarized at the point level for calculated emissions of at least 100 TPY for SO_2, NO_x, and VOC.

The complete point and area source NEDS data and the results of these three additional data screens were reviewed by the States. Questionable data were verified or corrected where possible through the same channels established for the previous State reviews. These changes were then updated to the 1985 NAPAP Emissions Inventory. All changes were documented through the Audit Trail Program.

4.4 RESULTS OF QC PROCEDURES

4.4.1 Analysis of Quality Control Results

Through the use of an extensive QC program on the 1985 NEDS State submittals, the resulting NAPAP interim point source data base represents the most complete and accurate inventory of acid rain precursors assembled to date. Essentially all data have a 1985 year of record; by contrast, in a typical NEDS year only 10 States are able to submit substantially current data. All States have participated in the 1985 inventory effort and submitted current data; whereas in general, previous NEDS data represent annual submissions by only

34 States. Previous inventories contain significant data omissions, even among priority data items, but in 1985, States delivered substantially all high priority data items.

Through cooperative work between States, Regional Offices, and several branches of EPA, and through regular updates of all data bases, State inventories and the 1985 NAPAP Emissions Inventory should have substantial agreement. In the case of records rejected by the NE061 program, complete replacement submittals of the data alleviated potential continued problems with erroneous data elements. EPA emphasized that States should submit emissions estimates for large sources wherever possible rather than allow NEDS to calculate emissions. EPA requested confirmation of emissions with facilities emitting over 2500 tons of SO_2 and NO_x to assure the accuracy of the emissions data for the largest point sources; about two-thirds of the States responded with confirmation letters. Computer checks served to ensure that data were within standard data ranges, and when data did fall out of range, consultation with State or local air pollution agencies could often confirm or resolve data issues.

4.4.2 Resolution of QC Problems

However, the QC program was not without its problems. Time and resource constraints, present at all levels of QC, made it difficult to track down missing data items and data elements which lay outside standard ranges. State data which had been confirmed with sources sometimes fell outside the data ranges, and therefore still evoked a warning message each time NE061 was run on the EPA data base. A more substantial problem occurred when emissions data were confirmed between a facility and the State, yet these confirmed emissions were still not in agreement with the data in NEDS. Lack of confirmation was a problem in over one-third of the States. It was often difficult to resolve discrepancies in source names and emissions data between 1984 and 1985 NEDS submittals. For example, Illinois and Michigan renumber their NEDS data submittals each year, making matchups between data from consecutive years especially difficult. Problems such as these were referred to the participating State agency for resolution, and in almost every case, the State was able to verify or correct these questionable items.

4.4.3 Remaining QC Questions

Several more serious problems remained in the emission inventory. Individual State confidentiality restrictions prevented the complete reporting of some priority data elements (e.g., fuel use, operating rate data). In consideration of this problem, EPA and the States worked together to reach compromises respecting both these confidentiality restrictions and the need for accurate and complete data. Specific cases are outlined below.

The State of Texas' Clean Air Act prohibits the public disclosure of facility operating rate data. Texas agreed to compare summaries of data submitted by Texas utilities to the Department of Energy with confidential utility information and to indicate where DOE data were in error, since these actions would not violate Texas Clean Air Act restrictions. EPA then estimated fuel consumption for Texas industrial boilers missing this data item as a check on the reasonableness of the emissions data provided by Texas. Texas consequently reviewed EPA's fuel consumption estimates and identified boilers with inaccurate emissions.

West Virginia had problems due to confidentiality restrictions and a shortfall of resources. The State agency had obtained 1984 operating rates and maximum design rates for chemical plants under an agreement which stipulated that the data remain confidential. In addition, State officials indicated that because of the effort expended in compiling the 1984 VOC emissions data base, the State would not have the resources to collect VOC emissions data for these sources for 1985. West Virginia and EPA agreed that the 1984 VOC data would fulfill the 1985 inventory objectives.

New Jersey and New York also had specific problems. Initially, State officials doubted that they could provide operating rate and actual emissions data, because the State agencies do not collect these data from plants. In both cases, EPA agreed to allow the State to report allowable emissions for plants emitting less than 1000 TPY of criteria pollutants but requested actual emissions data for plants emitting greater than 1000 TPY. New York was able to submit actual emissions data as reported by the plant for plants emitting greater than 100 TPY. For most points in the New Jersey inventory, operating rates were not reported. For New Jersey sources reporting over 1000 TPY of SO_2, NO_x, or VOC, operating rates were reported, but were not collected or reviewed according to NAPAP specifications. Consequently, these data do not meet the inventory criterion for quality.

Ohio and Virginia initially indicated confidentiality problems in reporting operating rate data. Ohio eventually was able to provide these data. Virginia did not submit operating rate data for noncombustion sources.

A potentially serious deficiency was recognized during the QC procedures designed to recognize missing facilities. Department of Defense (DOD) facilities were reported inconsistently in the 1985 NEDS submittals, and only a low percentage of those listed were identified as large point sources. Further investigation with State personnel revealed that most missing DOD facilities had not submitted data to the State. At that stage of the inventory effort, no resolution of this problem could be made for 1985. However, DOD facilities have been identified on a State-by-State basis to indicate those contained in the inventory, as well as those potentially missing from the inventory.

Another major problem with the entire NEDS data collection and QC effort was the incompatibility of various State computer systems with the NEDS system. In addition to delays caused by the extra work involved in translating data, this inconsistency caused some incomplete or garbled translation of data. Consequently, a more extensive data correction effort was required than would have been necessary if all the computer systems had been compatible. In cases where States had their emissions inventories stored in other forms (e.g., on micro-files), data translation and QC was an even lengthier process. In addition, the fact that State emissions tracking systems are typically designed for permit enforcement work meant that some data items were not in the form prescribed for NEDS and required some reworking. Although these problems were overcome, future inventory efforts will be subject to similar problems unless long-term solutions for data incompatibilities are developed and implemented.

4.5 QA/QC OF AREA SOURCE DATA

Quality assurance and quality control of area source emissions inventory data, like QA/QC of point source data, do not involve checks for data accuracy. Because there is no measured standard with which to compare area source emissions data nor previously defined QA/QC procedures, QC procedures were developed which focused on completeness and reasonableness of the county and gridded (SO_2, NO_x and VOC) emissions data, in addition to various input data.

Due to the quantity of data involved, activity level and emissions data from significant area source categories were plotted to locate missing data, gross errors, border discontinuities, and improper location of urban centers. Plots (maps) of the final area source emissions were then compared with appropriate plots of selected surrogate activity levels (e.g., population distribution). Direct visual comparisons of the emissions plots and plots of the surrogate data used to develop the estimates were used to isolate potential problems by illustrating dissimilar patterns in the data.

For the purposes of this study, since Regional Acid Deposition Modeling activities do not include any terrain west of the Rocky Mountains, areas in the U.S. located east of the Rocky Mountains received more attention, most specifically the Ohio River Valley. In addition, certain regions which have exhibited erroneous spatial distributions in previous inventories received more scrutiny in the QA process. These areas include St. Louis, northern West Virginia, Pittsburgh, Massachusetts, and Virginia.

In a separate analysis, emission factors for each area source category were reviewed for reasonableness. Sources of the original factors and their methods of calculation were sought to verify the factors which were used as NEDS input data.

Potential problems discovered during the QA analyses were recorded for later verification. Errors in the data were corrected when found, but in general, area source emissions estimates, activity level data, and emission factor data were found to be reasonable and complete.

4.5.1 Emission Factors

Emission factors for each area source category were traced back to the reference materials. Most emission factors for area sources were adapted from EPA's Compilation of Air Pollutant Emission Factors (AP-42). In some source categories, however, data were available to develop more applicable local factors. In addition, ten new categories for VOC emissions were added to the 1985 NAPAP Emissions Inventory that were not included in the 1980 inventory. The National Air Data Branch (NADB) and Alliance developed emission factors for these additional categories and for ammonia emissions categories. The emission factors associated with them may require further checks if discrepancies appear in area source emissions for these new categories.

4.5.2 Activity Levels

Activity levels were derived primarily from related information published by other Federal agencies, supplemented by special data developed by EPA for the purpose of developing NEDS area source inventories. Published data such as fuel use by State and county and forest fire acres burned by State are used with related data such as employment, population, and miscellaneous geographic or economic data to derive annual county estimates of the activity levels for each of the NEDS area source categories.

Surrogate indicators are defined as those variables used to spatially allocate area source activity levels to the county level in NEDS. Area source emissions are similarly allocated to the county level by county population, number of dwelling units, vehicle registration, and employment for various economic sectors. Surrogates examined in the area source QA efforts were selected based on the magnitude of national emissions contributed by respective area source categories. Surrogate information plotted at the county level included the following:

Population
Dwelling Units
Vehicle Registration
Manufacturing Employment
Commercial Employment
Solvent User Category Employment

For the most part, allocation variables were easily identified. However, default surrogates were assigned to those categories where either insufficient surrogate data were available or the NEDS allocation process used an algorithm based on more than one significant variable.

Initial comparisons of population, land use, dwelling units, employment, and vehicle registration plots indicated the general reliability of the data, as well as identifying potential errors early in the QC process. Correction of basic information before it was used to allocate State emissions to the county or grid should reduce errors in the final emissions estimates. Missing and incorrect data were flagged and corrected where possible.

4.5.3 Emissions

County emissions for the area source categories were estimated by NEDS using category-specific activity level data and the appropriate emission factors as shown in Section 3.2. Specific area source categories were selected for evaluation in the activity level QA efforts based on the magnitude of emissions contributed by particular area source categories. For each pollutant (SO_2, NO_x and VOC), the categories were ranked by emissions magnitude and the top categories were selected for detailed examination. These categories included:

- Stationary Sources -
  - Residential
  - Commercial/Institutional
  - Industrial

- Mobile Sources -
  - Light Duty Gasoline Vehicles
  - Light Duty Gasoline Trucks
  - Heavy Duty Gasoline Vehicles
  - Off Highway Vehicles
  - Locomotives

Aircraft
Marine Vessels

Miscellaneous Sources -
Solvents Purchased
Gasoline Marketed

Additional Sources -
Hazardous Waste TSDFs
Fugitives from Refinery Operations
Bulk Plants/Bulk Terminals

Emissions plots were then generated using county level data from NEDS. Each plot was reviewed for completeness before comparison with its surrogate activity level plot. This review included checks for inconsistencies, missing data, proper location of urban centers, and border problems. Emissions plots were then compared to the surrogate plots to ascertain inconsistencies in the data.

Final comparisons of the plots showed general agreement between the NEDS input data and the final emissions estimates for many of the significant categories. No major problems were found; however, potential minor concerns were noted. A small number of missing data items were corrected.

Section 4 References

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SECTION 5

INVENTORY RESULTS

5.1 SUMMARY

The 1985 National Acid Precipitation Assessment Program (NAPAP) Emissions Inventory was designed to provide the most accurate and comprehensive emissions and source data possible for sources of acid rain precursors within the schedule and resource constraints imposed by NAPAP. The assessment of the anthropogenic inventory presented in this section determines whether the inventory meets the requirements specified by NAPAP, as discussed in Section 3, and examines the emissions and source information. Sections 3 and 4 have described in detail the development, implementation, and quality control (QC) of the inventory to meet NAPAP specifications. This section reviews the source-specific and emissions data to provide an overview of inventory content, to draw conclusions from these data, and to allow the user community to assess the quality of the data.

The assessment of the 1985 NAPAP Emissions Inventory is divided into two major areas:

- An analysis of the comprehensiveness and quality of the point source data as specified by NAPAP and determined by the QC process, and
- A review of the emissions and source data, including an analysis of major sources of SO_2, NO_x, and VOC emissions in 1985.

5.2 COMPREHENSIVENESS AND QUALITY

The NAPAP objective was to provide a comprehensive and accurate inventory of acid rain precursors for the base year 1985. The inventory was to provide emissions estimates and sufficient information to allow temporal and spatial characterization of sources. In order to meet this objective within time and resource constraints, the inventory was prioritized to focus resources on plants emitting at least 1000 tons of SO_2, NO_x, or VOC in 1985 (referred to below as "priority plants"). Fourteen data elements, selected by NAPAP to fulfill the requirements of the atmospheric transport and deposition models (Section 3.1.2), were targeted for collection for the priority plants and pollutants.

Evaluating the comprehensiveness and quality of the point source data base involves determining the degree to which the inventory met the NAPAP objective. Summaries in this section describe the completeness and internal consistency of the data, and relate the data quality to existing data bases. The results reflect the most rigorous and broadly implemented QC effort ever undertaken for a national inventory. The following conclusions are supported by the detailed analysis of missing items, year of record, and data quality provided below:

- The 1985 NAPAP Emissions Inventory represents a coordinated effort by the States and EPA to assemble an annual inventory of acid rain precursor emissions. The result is the first annual data base which includes participation by all 48 contiguous States and the District of Columbia,

- Nearly 100 percent of emissions from priority plants were reported with 1985 year of record, establishing the 1985 baseline inventory requested by NAPAP,

- To provide complete and accurate data within resource constraints, the inventory and QC efforts were concentrated on priority plants. Priority plants emitted 97 percent, 90 percent, and 61 percent of the total point source SO_2, NO_x, and VOC, respectively.

- The fuel use comparison between the 1985 NAPAP Emissions Inventory and 1985 DOE data revealed that the 1985 NAPAP fuel use data are at least as complete as the DOE data for utilities. The two data bases agreed very closely in their estimates of coal use -- an important indicator, since coal combustion is the major source of point source SO_2 and NO_x.

- The 1985 NAPAP Emissions Inventory represents the first time that the results of a computer-generated error check and audit trail have been provided to and reviewed by State personnel to locate and correct erroneous data. The result has been the correction or validation of NEDS data for priority plants.

- The States reported SO_2, NO_x, and VOC emissions estimates for more than 90 percent of the points at priority plants, reducing the proportion of the point source emissions calculated by EPA rather than the States.

- The States reported more than 90 percent of the applicable priority NEDS data items for priority plants, with the exception of control equipment and efficiencies and State-confidential items.

- Emissions estimation procedures were standardized according to the priority set forward in Section 3.1.7. Estimation procedures reflect these priorities and utilize either source-specific or standard emission factors.

5.2.1 State Participation for 1985

Forty-eight States and the District of Columbia reported point source emissions estimates for the 1985 NAPAP Emissions Inventory. By comparison, previous years' NEDS inventories have been less complete. Typically, NEDS data have represented annual submissions by 34 States, only 10 of which have submitted substantially current data. Many submissions have contained significant omissions of emissions and source data.

A main objective of the 1985 NAPAP inventory was to collect actual 1985 emissions estimates from all the States. With a few exceptions, such as the use of 1984 data from VOC sources in West Virginia to represent 1985 data, the 1985 NAPAP Emissions Inventory is the first to establish a consistent baseline year nationally.

As shown in Table 5-1, the 1985 NAPAP Emissions Inventory represents 1985 emissions for nearly 100 percent of SO_2, 100 percent of NO_x, and 99 percent of VOC from plants emitting at least 1000 tons of SO_2, NO_x, or VOC in 1985. The SO_2 data represent only one plant with non-1985 emissions data and the non-1985 VOC data comprise plants in West Virginia as described previously. By comparison, 1993 of 3466 plants in the 1980 NEDS data base had non-1980 years of record (58 percent). These figures show that the goal of providing a true 1985 baseline has been met.

TABLE 5-1. PERCENT EMISSIONS BY YEAR OF EMISSIONS (1000 TPY PLANTS)

	--- SO_2 ---		NO_x	--- VOC ---	
STATE	1985	1982	1985	1985	1984
Alabama	100%		100%	100%	
Arizona	100%		100%	100%	
Arkansas	100%		100%	100%	
California	100%		100%	100%	
Colorado	100%		100%	100%	
Connecticut	100%		100%	100%	
Delaware	100%		100%	100%	
Dist. of Col.	100%		100%	100%	
Florida	98%	2%	100%	100%	
Georgia	100%		100%	100%	
Idaho	100%		100%	100%	
Illinois	100%		100%	100%	
Indiana	100%		100%	100%	
Iowa	100%		100%	100%	
Kansas	100%		100%	100%	
Kentucky	100%		100%	100%	
Louisiana	100%		100%	100%	
Maine	100%		100%	100%	
Maryland	100%		100%	100%	
Massachusetts	100%		100%	100%	
Michigan	100%		100%	100%	
Minnesota	100%		100%	100%	
Mississippi	100%		100%	100%	
Missouri	100%		100%	100%	
Montana	100%		100%	100%	
Nebraska	100%		100%	100%	
Nevada	100%		100%	100%	
New Hampshire	100%		100%	100%	
New Jersey	100%		100%	100%	
New Mexico	100%		100%	100%	
New York	100%		100%	100%	
North Carolina	100%		100%	100%	
North Dakota	100%		100%	100%	
Ohio	100%		100%	100%	
Oklahoma	100%		100%	100%	
Oregon	100%		100%	100%	
Pennsylvania	100%		100%	100%	
Rhode Island	100%		100%	100%	
South Carolina	100%		100%	100%	
South Dakota	100%		100%	100%	
Tennessee	100%		100%	100%	
Texas	100%		100%	100%	
Utah	100%		100%	100%	
Vermont	100%		100%	100%	
Virginia	100%		100%	100%	
Washington	100%		100%	100%	
West Virginia*	100%		100%	83%	17%
Wisconsin	100%		100%	100%	
Wyoming	100%		100%	100%	

* Submitted 1984 data for certain VOC sources under agreement with EPA

5.2.2 Emissions Sorting and Confirmation

Emissions sorting refers to the distribution of emissions by plant emissions magnitude classes. The 1985 NAPAP Emissions Inventory collection methodology was designed to target resources to improve the quality of data related to major emitters. Assumptions based on previous inventory experience established priorities in data collection at the 1000 TPY plant level for SO_2, NO_x, and VOC, and added the confirmation step at 2500 TPY. The inventory data now allow the validity of these collection criteria to be judged, while confirmation reports reveal the success of the added confirmation step.

Table 1-7 in Section 1 showed that 97 percent of SO_2, 90 percent of NO_x, and 61 percent of VOC point source emissions come from plants emitting at least 1000 tons of the respective pollutants in 1985. This analysis is extended to each State in Table 5-2.

Table 5-2 also presents NEDS-calculated emissions by State. These figures indicate emissions of SO_2, NO_x, and VOC which NEDS has calculated using the SCC emission factor file[1] and operational data supplied by the State. In these cases, the State did not estimate emissions for one or more pollutants and instead specified method code '3'. Therefore, these emissions are not State-generated, although the State has reviewed and commented on the results for priority plants and points greater than 25 TPY. As indicated by the table, only nine States report calculated emissions representing more than ten percent of total State emissions for SO_2, NO_x, or VOC. These calculations were principally for VOCs.

Plants with large SO_2 or NO_x emissions were to be subject to confirmation of emissions estimates by the plant personnel themselves, as described in Section 3. As seen in Table 5-2, confirmation of emissions has been reported by 31 of 49 States. For States reporting confirmation, results have varied from State to State: in some cases the confirmation process was completed, while in other cases, some plants meeting the criteria did not confirm the estimates.

A review of the final confirmation reports has identified three problems. First, confirmed emissions from facilities may not have been reported to EPA despite State completion of the confirmation process. This results in an

TABLE 5-2. EMISSIONS SORTING AND EDIT CHECKING RESULTS BY STATE (POINT SOURCES ONLY)

EMISSIONS SORTING	AL	AZ	AR	CA	CO	CT	DE
SO_2							
% Emissions at >2500 TPY Plants	94%	99%	81%	35%	83%	89%	91%
% Emissions at 1000 - 2500 TPY Plants	4%	1%	12%	24%	14%	1%	4%
% Emissions at 100 - 1000 TPY Plants	2%	0%	7%	38%	3%	9%	4%
% Emissions at 0 - 100 TPY Plants	0%	0%	0%	3%	0%	1%	1%
Number of Plants Confirmed	22	8	10			7	
% of Total State Emissions Confirmed	80%	96%	97%			89%	
Points with Calculated Emissions	78	1	534	1	118	35	171
% of Total State Emissions Calculated	0%	0%	0%	0%	0%	1%	65%
NO_x							
% Emissions at >2500 TPY Plants	83%	92%	71%	43%	82%	56%	87%
% Emissions at 1000 - 2500 TPY Plants	9%	2%	12%	26%	7%	27%	5%
% Emissions at 100 - 1000 TPY Plants	7%	6%	16%	28%	11%	13%	6%
% Emissions at 0 - 100 TPY Plants	1%	0%	1%	3%	0%	4%	2%
Number of Plants Confirmed	12	6	9			7	
% of Total State Emissions Confirmed	48%	66%	81%			83%	
Points with Calculated Emissions	318	1	558	1	116	35	179
% of Total State Emissions Calculated	1%	0%	10%	0%	0%	1%	87%
VOC							
% Emissions at >2500 TPY Plants	52%	0%	22%	8%	0%	0%	43%
% Emissions at 1000 - 2500 TPY Plants	20%	29%	39%	14%	20%	0%	50%
% Emissions at 100 - 1000 TPY Plants	26%	62%	35%	68%	66%	67%	3%
% Emissions at 0 - 100 TPY Plants	2%	9%	4%	10%	14%	33%	4%
Points with Calculated Emissions	366	1	483	1	2	35	164
% of Total State Emissions Calculated	14%	0%	12%	0%	0%	0%	4%
COMPUTERIZED EDIT CHECK RESULTS (NE061)							
Number of Rejection Messages	492	27	0	3	0	2	0
Number of Warning Messages	36	25	366	1401	11	28	13

TABLE 5-2. (continued)

EMISSIONS SORTING	DC	FL	GA	ID	IL	IN	IA
SO_2							
% Emissions at >2500 TPY Plants	0%	92%	96%	74%	95%	96%	94%
% Emissions at 1000 - 2500 TPY Plants	0%	5%	2%	14%	2%	2%	3%
% Emissions at 100 - 1000 TPY Plants	100%	3%	2%	12%	2%	2%	2%
% Emissions at 0 - 100 TPY Plants	0%	0%	0%	0%	1%	0%	1%
Number of Plants Confirmed		40	13			102	
% of Total State Emissions Confirmed		31%	95%			61%	
Points with Calculated Emissions	47	538	11	1	1	220	2001
% of Total State Emissions Calculated	98%	2%	0%	0%	0%	0%	0%
NO_x							
% Emissions at >2500 TPY Plants	0%	84%	89%	0%	87%	89%	78%
% Emissions at 1000 - 2500 TPY Plants	0%	8%	3%	19%	6%	5%	10%
% Emissions at 100 - 1000 TPY Plants	84%	7%	7%	80%	6%	5%	11%
% Emissions at 0 - 100 TPY Plants	16%	1%	1%	1%	1%	1%	1%
Number of Plants Confirmed		40	14			102	
% of Total State Emissions Confirmed		37%	93%			47%	
Points with Calculated Emissions	43	691	10	1	1	201	1977
% of Total State Emissions Calculated	84%	3%	0%	0%	0%	0%	0%
VOC							
% Emissions at >2500 TPY Plants	0%	0%	25%	0%	38%	55%	0%
% Emissions at 1000 - 2500 TPY Plants	0%	13%	26%	0%	24%	14%	21%
% Emissions at 100 - 1000 TPY Plants	84%	79%	45%	73%	36%	29%	71%
% Emissions at 0 - 100 TPY Plants	16%	8%	4%	27%	2%	2%	8%
Points with Calculated Emissions	48	715	9	2	1	163	1535
% of Total State Emissions Calculated	16%	22%	0%	0%	0%	4%	0%
COMPUTERIZED EDIT CHECK RESULTS (NE061)							
Number of Rejection Messages	0	0	119	24	0	242	465
Number of Warning Messages	0	575	44	13	0	855	324

TABLE 5-2. (continued)

EMISSIONS SORTING	KS	KY	LA	ME	MD	MA	MI
SO_2							
% Emissions at >2500 TPY Plants	87%	97%	83%	63%	92%	89%	88%
% Emissions at 1000 - 2500 TPY Plants	12%	1%	12%	20%	2%	3%	6%
% Emissions at 100 - 1000 TPY Plants	1%	2%	5%	16%	5%	8%	6%
% Emissions at 0 - 100 TPY Plants	0%	0%	0%	1%	1%	0%	0%
Number of Plants Confirmed		33	56		3	6	12
% of Total State Emissions Confirmed		96%	42%		1%	1%	85%
Points with Calculated Emissions	48	1	4009	34	1	40	2490
% of Total State Emissions Calculated	0%	0%	0%	0%	0%	0%	4%
NO_x							
% Emissions at >2500 TPY Plants	67%	93%	70%	25%	82%	82%	82%
% Emissions at 1000 - 2500 TPY Plants	17%	2%	14%	34%	5%	1%	7%
% Emissions at 100 - 1000 TPY Plants	15%	4%	15%	35%	11%	14%	10%
% Emissions at 0 - 100 TPY Plants	1%	1%	1%	6%	2%	3%	1%
Number of Plants Confirmed		33	56		3	6	12
% of Total State Emissions Confirmed		93%	43%		2%	1%	86%
Points with Calculated Emissions	48	1	4011	35	3	39	2510
% of Total State Emissions Calculated	0%	0%	0%	0%	0%	0%	5%
VOC							
% Emissions at >2500 TPY Plants	48%	12%	50%	0%	0%	11%	37%
% Emissions at 1000 - 2500 TPY Plants	29%	43%	22%	19%	40%	28%	37%
% Emissions at 100 - 1000 TPY Plants	17%	43%	26%	78%	52%	59%	24%
% Emissions at 0 - 100 TPY Plants	6%	2%	2%	3%	8%	2%	2%
Points with Calculated Emissions	9	1	1096	15	1	10	2467
% of Total State Emissions Calculated	0%	0%	0%	1%	0%	0%	13%
COMPUTERIZED EDIT CHECK RESULTS (NE061)							
Number of Rejection Messages	4	76	14	3	0	0	0
Number of Warning Messages	56	112	1026	28	22	22	0

TABLE 5-2. (continued)

EMISSIONS SORTING	MN	MS	MO	MT	NE	NV	NH
SO_2							
% Emissions at >2500 TPY Plants	76%	90%	98%	87%	84%	95%	93%
% Emissions at 1000 - 2500 TPY Plants	12%	7%	1%	8%	11%	0%	2%
% Emissions at 100 - 1000 TPY Plants	12%	3%	1%	5%	5%	4%	5%
% Emissions at 0 - 100 TPY Plants	0%	0%	0%	0%	0%	1%	0%
Number of Plants Confirmed	38	12		6	16		3
% of Total State Emissions Confirmed	86%	85%		41%	62%		93%
Points with Calculated Emissions	777	2	2379	245	76	96	2
% of Total State Emissions Calculated	0%	0%	2%	0%	0%	0%	0%
NO_x							
% Emissions at >2500 TPY Plants	77%	64%	89%	68%	75%	96%	91%
% Emissions at 1000 - 2500 TPY Plants	9%	20%	8%	16%	14%	0%	0%
% Emissions at 100 - 1000 TPY Plants	13%	15%	2%	15%	10%	3%	7%
% Emissions at 0 - 100 TPY Plants	1%	1%	1%	1%	1%	1%	2%
Number of Plants Confirmed	38	12		6	15		3
% of Total State Emissions Confirmed	90%	66%		71%	78%		90%
Points with Calculated Emissions	780	4	2287	282	78	89	2
% of Total State Emissions Calculated	0%	0%	2%	3%	0%	0%	0%
VOC							
% Emissions at >2500 TPY Plants	60%	18%	48%	44%	0%	0%	0%
% Emissions at 1000 - 2500 TPY Plants	5%	24%	19%	29%	31%	0%	0%
% Emissions at 100 - 1000 TPY Plants	33%	55%	32%	19%	56%	82%	98%
% Emissions at 0 - 100 TPY Plants	2%	3%	1%	8%	13%	18%	2%
Points with Calculated Emissions	892	2	1404	261	60	23	1
% of Total State Emissions Calculated	3%	0%	5%	10%	1%	0%	0%
COMPUTERIZED EDIT CHECK RESULTS (NE061)							
Number of Rejection Messages	0	8	0	0	0	0	0
Number of Warning Messages	344	6	2106	106	14	0	4

TABLE 5-2. (continued)

EMISSIONS SORTING	NJ	NM	NY	NC	ND	OH	OK
SO_2							
% Emissions at >2500 TPY Plants	79%	92%	86%	89%	96%	96%	85%
% Emissions at 1000 - 2500 TPY Plants	7%	5%	4%	3%	1%	2%	6%
% Emissions at 100 - 1000 TPY Plants	12%	3%	10%	8%	3%	2%	4%
% Emissions at 0 - 100 TPY Plants	2%	0%	0%	0%	0%	0%	5%
Number of Plants Confirmed		16	31	18	15		14
% of Total State Emissions Confirmed		63%	88%	59%	75%		59%
Points with Calculated Emissions	1	576	1	592	1	1	5
% of Total State Emissions Calculated	0%	0%	0%	0%	0%	0%	0%
NO_x							
% Emissions at >2500 TPY Plants	70%	66%	75%	87%	91%	88%	50%
% Emissions at 1000 - 2500 TPY Plants	13%	19%	7%	5%	3%	5%	22%
% Emissions at 100 - 1000 TPY Plants	15%	14%	15%	5%	6%	6%	27%
% Emissions at 0 - 100 TPY Plants	2%	1%	3%	3%	0%	1%	1%
Number of Plants Confirmed		15	31	10	15		14
% of Total State Emissions Confirmed		41%	78%	66%	86%		40%
Points with Calculated Emissions	1	279	1	643	1	1	5
% of Total State Emissions Calculated	0%	1%	0%	2%	0%	0%	0%
VOC							
% Emissions at >2500 TPY Plants	19%	0%	38%	30%	0%	29%	13%
% Emissions at 1000 - 2500 TPY Plants	30%	22%	5%	11%	0%	19%	21%
% Emissions at 100 - 1000 TPY Plants	45%	67%	46%	57%	77%	49%	55%
% Emissions at 0 - 100 TPY Plants	6%	11%	11%	2%	23%	3%	11%
Points with Calculated Emissions	1	406	1	456	1	1	5
% of Total State Emissions Calculated	0%	1%	0%	3%	0%	0%	0%
COMPUTERIZED EDIT CHECK RESULTS (NE061)							
Number of Rejection Messages	0	0	0	0	0	456	0
Number of Warning Messages	353	776	353	57	6	348	7

TABLE 5-2. (continued)

EMISSIONS SORTING	OR	PA	RI	SC	SD	TN	TX
SO_2							
% Emissions at >2500 TPY Plants	21%	93%	0%	88%	88%	96%	89%
% Emissions at 1000 - 2500 TPY Plants	55%	3%	58%	6%	7%	1%	8%
% Emissions at 100 - 1000 TPY Plants	22%	4%	41%	6%	5%	3%	3%
% Emissions at 0 - 100 TPY Plants	2%	0%	1%	0%	0%	0%	0%
Number of Plants Confirmed			1	24	2	25	147
% of Total State Emissions Confirmed			74%	48%	88%	63%	96%
Points with Calculated Emissions	120	2081	642	59	1	1772	1
% of Total State Emissions Calculated	44%	1%	59%	0%	0%	0%	0%
NO_x							
% Emissions at >2500 TPY Plants	0%	84%	0%	78%	72%	83%	82%
% Emissions at 1000 - 2500 TPY Plants	32%	7%	45%	11%	19%	9%	13%
% Emissions at 100 - 1000 TPY Plants	66%	8%	50%	10%	8%	7%	5%
% Emissions at 0 - 100 TPY Plants	2%	1%	5%	1%	1%	1%	0%
Number of Plants Confirmed			1	29	2	25	189
% of Total State Emissions Confirmed			65%	66%	72%	65%	94%
Points with Calculated Emissions	146	1751	651	59	1	1748	1
% of Total State Emissions Calculated	81%	1%	5%	0%	0%	7%	0%
VOC							
% Emissions at >2500 TPY Plants	0%	19%	0%	38%	69%	52%	70%
% Emissions at 1000 - 2500 TPY Plants	52%	24%	0%	17%	0%	9%	18%
% Emissions at 100 - 1000 TPY Plants	38%	47%	96%	39%	25%	37%	11%
% Emissions at 0 - 100 TPY Plants	10%	10%	4%	6%	6%	2%	1%
Points with Calculated Emissions	133	1926	333	6	1	977	1
% of Total State Emissions Calculated	27%	6%	16%	0%	0%	2%	0%
COMPUTERIZED EDIT CHECK RESULTS (NE061)							
Number of Rejection Messages	24	4	0	0	0	14	7
Number of Warning Messages	7	2881	2	28	4	2541	1572

TABLE 5-2. (continued)

EMISSIONS SORTING	UT	VT	VA	WA	WV	WI	WY
SO_2							
% Emissions at >2500 TPY Plants	95%	0%	84%	82%	98%	92%	86%
% Emissions at 1000 - 2500 TPY Plants	0%	45%	7%	9%	1%	5%	10%
% Emissions at 100 - 1000 TPY Plants	5%	42%	8%	8%	1%	3%	4%
% Emissions at 0 - 100 TPY Plants	0%	13%	1%	1%	0%	0%	0%
Number of Plants Confirmed	9	1			35		10
% of Total State Emissions Confirmed	50%	45%			76%		62%
Points with Calculated Emissions	1	1	1353	1	5558	1	1
% of Total State Emissions Calculated	0%	0%	0%	0%	1%	0%	0%
NO_x							
% Emissions at >2500 TPY Plants	75%	0%	80%	55%	90%	79%	83%
% Emissions at 1000 - 2500 TPY Plants	8%	0%	8%	21%	3%	9%	6%
% Emissions at 100 - 1000 TPY Plants	17%	87%	9%	22%	6%	10%	9%
% Emissions at 0 - 100 TPY Plants	0%	13%	3%	2%	1%	2%	2%
Number of Plants Confirmed	9	1			35		10
% of Total State Emissions Confirmed	61%	0%			76%		62%
Points with Calculated Emissions	1	1	1360	1	5510	1	1
% of Total State Emissions Calculated	0%	0%	0%	0%	3%	0%	0%
VOC							
% Emissions at >2500 TPY Plants	0%	0%	33%	13%	62%	16%	57%
% Emissions at 1000 - 2500 TPY Plants	28%	0%	27%	33%	17%	29%	13%
% Emissions at 100 - 1000 TPY Plants	67%	95%	38%	47%	19%	51%	18%
% Emissions at 0 - 100 TPY Plants	5%	5%	2%	7%	2%	4%	12%
Points with Calculated Emissions	1	1	718	1	3055	1	1
% of Total State Emissions Calculated	0%	0%	0%	0%	55%	0%	0%
COMPUTERIZED EDIT CHECK RESULTS (NE061)							
Number of Rejection Messages	8	0	0	1146	0	0	0
Number of Warning Messages	1	1618	899	5977	225	19	0

underestimate of emissions reported as confirmed. Second, some State confirmation reports do not match the SO_2 or NO_x emissions in their final NEDS submissions. This discrepancy may be caused by misreporting in either the confirmation report or NEDS, or by the reporting of preliminary emissions results rather than final results in the confirmation report. The effect on the data base could be under- or over-reporting in these cases. Third, there are cases in which the confirmation process was not completed; these emissions are not confirmed and not listed as confirmed.

Confirmation of emissions has improved confidence in the data by serving as an additional review at the source level. In cases in which confirmation was completed and reported, between 30 and 90 percent of total State SO_2 and NO_x emissions had been reviewed by the plant. Insofar as confirmation of facilities emitting at least 2500 TPY has not been implemented, the full potential for improvement to the data base has not been realized.

5.2.3 Fuel Use

DOE fuel use data have historically been considered the most comprehensive and reliable utility fuel use data available. A significant effort was made to collect accurate combustion rate data for the inventory because fuel use and emission factors are the parameters applied when emissions estimates are computed. The presence of an analogous DOE data base for utility fuel use, reported in the 1985 Electric Power Annual[2], permits a comparison to State fuel use patterns in the 1985 NAPAP Emissions Inventory. These data are considered the most accurate of the DOE data bases, although comparisons with NAPAP data are only possible at the national and State levels. Agreement or disagreement between the two data bases does not in itself validate or invalidate either data set. Agreement does, however, lend confidence to the rates and, therefore, to the emissions estimates in the 1985 NAPAP Emissions Inventory.

Fuel consumption can be matched for three fuels (coal, oil, and natural gas) across four use categories: utility, industrial, commercial, and residential. Consumption estimates can be directly related only for utilities, as DOE maintains consumption records only for the utility sector in the 1985

Electric Power Annual.[2] NAPAP inventory consumption estimates for the remaining categories can be related to DOE fuel delivery records,[3,4,5] providing an indirect comparison. Unfortunately, no direct comparison of fuel use (and therefore, emissions) is possible for industrial fuels.

In all cases, the coal category considers lignite, anthracite, and bituminous coals. Consumption figures for different types are distinct in the 1985 NAPAP Emissions Inventory, but are combined for the purposes of this correlation. The oil category includes both distillate and residual oils.

Utilities--The analysis presented provides explanations only in general terms for the discrepancies found. An analysis now underway of utility fuel consumption in both the NAPAP and DOE data bases will clarify the causes of these inconsistencies. This analysis is taking place at the plant and boiler level utilizing DOE Forms 759/767 and FERC Form 423. At the preliminary stage, it appears that there have been reporting errors in the DOE Form 767 data as well as inconsistencies in the 1985 NAPAP Emissions Inventory. Resolution of these problems will entail identifying the most accurate and comprehensive utility fuel use data and incorporating any necessary changes into later versions of the inventory as it is processed. For this comparison, the utility sector has been defined as all fuel use labeled 'Electric Generation' by NEDS, including internal and external combustion.

Consumption figures for coal as reported by the DOE Energy Information Administration (EIA) and the 1985 NAPAP Emissions Inventory are presented in Table 5-3. Also included is the difference (NAPAP minus DOE) between the data bases. There is close agreement in the figures for total U.S. consumption: 692 thousand tons in NAPAP and 694 thousand tons from DOE (a 0.3 percent variation). Furthermore, this agreement carries to the State level. It must be noted that the States of New Jersey, New York, and Virginia had difficulty in collecting operating rate data, including utility fuel consumption, and were released from this requirement. Every effort was made to include utility data in the final 1985 submittal, however. Texas was barred by State regulation from reporting these data for individual plants, although a special cooperative effort between Texas and EPA documented fuel use at the county level for the

TABLE 5-3. COAL CONSUMPTION COMPARISON FOR UTILITIES

STATE	1985 COAL CONSUMPTION (10^3 Tons) NEDS	DOE/EIA	Difference
Alabama	23,163	21,545	1,618
Arizona	13,913	14,448	(535)
Arkansas	11,701	12,301	(600)
California	0	0	0
Colorado	13,710	14,294	(584)
Connecticut	774	774	0
Delaware	2,424	2,513	(89)
Dist. of Col.	0	0	0
Florida	18,135	18,283	(148)
Georgia	28,131	28,285	(154)
Idaho	0	0	0
Illinois	30,295	31,607	(1,312)
Indiana	39,473	38,310	1,163
Iowa	12,558	12,491	67
Kansas	14,342	14,350	(8)
Kentucky	27,140	27,085	55
Louisiana	6,801	8,760	(1,959)
Maine	0	0	0
Maryland	7,049	7,046	3
Massachusetts	4,255	3,865	390
Michigan	25,729	25,903	(174)
Minnesota	11,690	11,497	193
Mississippi	4,269	4,267	2
Missouri	23,232	22,778	454
Montana	5,480	5,480	0
Nebraska	6,432	6,380	52
Nevada	5,656	5,427	229
New Hampshire	1,436	1,433	3
New Jersey	2,318	3,476	(1,158)
New Mexico	15,204	14,498	706
New York	7,578	7,787	(209)
North Carolina	19,764	19,610	154
North Dakota	17,705	17,354	351
Ohio	47,390	46,700	690
Oklahoma	12,804	12,747	57
Oregon	417	418	(1)
Pennsylvania	41,731	41,869	(138)
Rhode Island	0	0	0
South Carolina	7,665	7,888	(223)
South Dakota	2,296	2,406	(110)
Tennessee	21,086	20,852	234
Texas	72,639	71,818	821
Utah	6,337	6,324	13
Vermont	29	28	1
Virginia	7,278	7,166	112
Washington	5,205	5,192	13
West Virginia	31,330	31,366	(36)
Wisconsin	16,117	15,881	236
Wyoming	20,477	21,173	(696)
U.S. TOTAL	693,158	693,675	(517)

DOE/EIA Fuel Totals from the 1985 Electric Power Annual utility sector. In spite of these limitations, only New Jersey displays a large apparent discrepancy in the data for these States.

Oil consumption is tabulated in Table 5-4. Although U.S. totals from NEDS and DOE differ by about 12 percent, individual States show much greater ranges in variation. After accounting for the four States with known problems, agreement on the national level is significantly improved, but State-level variation can still be large. Two factors may explain this discrepancy. First, it should be noted that during the QC effort, misreporting of units for oil use for NEDS was not an uncommon finding. Second, start-up fuels are frequently not recorded by States in NEDS, which may result in some variation in fuel use for oil (and natural gas) between the data bases. This results in only a small under-reporting of utility emissions, which come mostly from coal combustion.

Utility consumption of natural gas is displayed in Table 5-5. As with oil, a significant overall difference (21 percent) between data bases is observed. On a State-by-State basis, the comparison between DOE and NAPAP data appears better than that for oil, with the majority of the nationwide discrepancy attributable to the 790 thousand MMCF difference for Texas. However, utility fuel consumption was carefully collected in Texas, using both State inventory records and DOE data to produce an accurate inventory at the county level. Under-reporting of start-up fuels in NEDS may also affect this category, although this practice will result in only a slight under-reporting of utility emissions.

Industrial and Commercial/Residential Fuel Use--Comparison of fuel use for the industrial and commercial/residential sectors from the data bases is complicated by two factors. First, the 1985 NAPAP Emissions Inventory reports fuel consumed, but DOE reports fuel delivered. Second, the NAPAP fuel estimates are not independent of the DOE data, since NEDS area source fuel usages are based on the DOE totals in each category: NEDS point source totals are subtracted from the DOE data to produce the area source fuel use estimated. However, other adjustments made within NEDS, including those to prevent 'negative' emissions reportings, make a one-to-one correspondence between data bases unlikely. Table 5-6 contains the distribution of fuels between point

TABLE 5-4. OIL CONSUMPTION COMPARISON FOR UTILITIES

STATE	1985 OIL CONSUMPTION (10^3 Gallons)		
	NEDS	DOE/EIA	Difference
Alabama	11,502	3,704	7,798
Arizona	30,075	13,272	16,803
Arkansas	4,439	865	3,574
California	209,819	206,833	2,986
Colorado	2,350	5,090	(2,740)
Connecticut	714,386	717,754	(3,368)
Delaware	112,302	115,538	(3,236)
Dist. of Col.	9,243	13,285	(4,042)
Florida	992,613	572,359	420,254
Georgia	6,969	12,251	(5,282)
Idaho	0	59	(59)
Illinois	134,352	126,214	8,138
Indiana	16,951	17,392	(441)
Iowa	1,643	4,347	(2,704)
Kansas	8,153	9,034	(881)
Kentucky	1,927	11,331	(9,404)
Louisiana	23,541	8,030	15,511
Maine	145,010	145,349	(339)
Maryland	256,103	250,375	5,728
Massachusetts	887,539	1,020,050	(132,511)
Michigan	38,009	1,168	36,841
Minnesota	1,013	2,079	(1,066)
Mississippi	4,790	7,093	(2,303)
Missouri	7,576	9,172	(1,596)
Montana	0	1,604	(1,604)
Nebraska	959	2,578	(1,619)
Nevada	53	4,389	(4,336)
New Hampshire	98,028	99,241	(1,213)
New Jersey	645,755	238,064	407,691
New Mexico	552	3,607	(3,055)
New York	1,782,082	1,849,705	(67,623)
North Carolina	17,776	18,606	(830)
North Dakota	822	3,104	(2,282)
Ohio	21,901	27,262	(5,361)
Oklahoma	1,851	3,654	(1,803)
Oregon	0	122	(122)
Pennsylvania	580,649	547,882	32,767
Rhode Island	28,319	30,563	(2,244)
South Carolina	4,742	7,741	(2,999)
South Dakota	1,153	1,667	(514)
Tennessee	8,263	9,949	(1,686)
Texas	234,054	69,577	164,477
Utah	2,281	3,356	(1,075)
Vermont	963	1,411	(448)
Virginia	66,195	68,918	(2,723)
Washington	734	701	33
West Virginia	12,751	15,502	(2,751)
Wisconsin	5,605	10,516	(4,911)
Wyoming	6,087	6,001	86
U.S. TOTAL	7,141,880	6,298,364	843,516

TABLE 5-5. NATURAL GAS CONSUMPTION COMPARISON FOR UTILITIES

STATE	1985 NATURAL GAS CONSUMPTION (MMCF) NEDS	DOE/EIA	Difference
Alabama	945	1,078	(133)
Arizona	26,304	41,729	(15,425)
Arkansas	10,617	11,410	(793)
California	669,493	666,273	3,220
Colorado	6,734	4,913	1,821
Connecticut	1,559	1,558	1
Delaware	824	7,266	(6,442)
Dist. of Col.	0	0	0
Florida	160,861	165,682	(4,821)
Georgia	7,634	885	6,749
Idaho	0	24	(24)
Illinois	9,440	5,881	3,559
Indiana	837	1,116	(279)
Iowa	1,648	2,100	(452)
Kansas	16,805	21,180	(4,375)
Kentucky	1,399	1,120	279
Louisiana	323,678	285,039	38,639
Maine	0	0	0
Maryland	3,544	1,372	2,172
Massachusetts	45,419	45,161	258
Michigan	11,119	10,092	1,027
Minnesota	1,960	1,275	685
Mississippi	56,303	53,579	2,724
Missouri	4,486	1,466	3,020
Montana	0	468	(468)
Nebraska	483	1,284	(801)
Nevada	7,219	8,179	(960)
New Hampshire	65	0	65
New Jersey	27,297	61,362	(34,065)
New Mexico	38,727	28,133	10,594
New York	157,721	172,631	(14,910)
North Carolina	0	595	(595)
North Dakota	287	2	285
Ohio	454	699	(245)
Oklahoma	197,087	200,686	(3,599)
Oregon	0	0	0
Pennsylvania	721	1,556	(835)
Rhode Island	2,532	2,532	0
South Carolina	259	483	(224)
South Dakota	12	26	(14)
Tennessee	0	0	0
Texas	1,988,112	1,197,590	790,522
Utah	18,311	234	18,077
Vermont	94	95	(1)
Virginia	1,269	1,528	(259)
Washington	0	77	(77)
West Virginia	0	122	(122)
Wisconsin	5,520	1,317	4,203
Wyoming	262	132	130
U.S. TOTAL	3,808,041	3,009,930	798,111

TABLE 5-6. COMPARISON OF NEDS AND DOE 1985 NATIONAL FUEL USE TOTALS

FUEL (Units)	CATEGORY	NEDS Point	NEDS Area	NEDS Total	DOE Total	DIFFERENCE (NEDS-DOE)
Distillate Oil (10^6 gallons)	Industrial	1,002	3,070	4,072	3,825	247
	Commercial	9	5,179	5,188	5,211	(23)
	Residential	0	8,334	8,334	8,022	312
	Subtotal	1,011	16,583	17,594	17,058	535
Residual Oil (10^6 gallons)	Industrial*	5,205	1,691	6,895	4,635	2,261
	Commercial	457	1,140	1,597	1,516	81
	Subtotal	5,662	2,831	8,493	6,151	2,342
Natural Gas (10^9 cubic feet)	Industrial	3,854	3,046	6,900	6,704	196
	Commercial	97	2,304	2,401	2,410	(9)
	Residential+	0	4,952	4,952	4,952	(1)
	Subtotal	3,951	10,301	14,252	14,066	186
Coal# (10^3 tons)	Industrial	66,538	13,464	80,002	75,326	4,676
	Commercial/ Residential	3,832	4,239	8,071	7,343	728
	Subtotal	70,370	17,703	88,074	82,669	5,405

* California oil production fields are known to burn significant quantities of oil not reported to DOE; this also may occur in other oil-producing States.

+ Residential natural gas use includes DOE residential LPG totals.

# Coal totals include anthracite, bituminous, and lignite coals.

and area sources, and shows that the allocation process had a small effect on the total fuel consumed.

5.2.4 Data Quality

Although the 1985 NAPAP Inventory utilized an existing computer system (NEDS), the inventory process was designed to meet specific NAPAP research needs. The resulting NAPAP Emissions Inventory is not directly comparable to previous NEDS inventories, due to differences in methodology, purpose, and QC. As discussed in Section 4, the accuracy of inventory data cannot be measured. It is possible, however, to present a qualitative analysis of the accuracy of the 1985 NAPAP Emissions Inventory by examining whether it met the inventory objectives for quality. The section reviews the results of some analyses of the inventory's success in meeting its data quality objectives.

5.2.4.1 NEDS Edit Messages

Section 4 addresses the function of computerized NEDS edit software and the rejection and warning messages that result. Rejections indicate invalid data that do not conform to NEDS requirements and may prevent the data from being further processed. Part of the review process entailed correction of these errors by the State air pollution control agencies. The number of rejections does not correspond exactly to the number of points rejected, as a single point can generate one or more rejection messages.

Warnings are a less serious problem and identify data items which have coding errors or which fall outside of standard, preset data ranges. Again, the number of warnings does not correspond to the number of points with warnings. Data with warning messages are included in the computerized data base even if these data are not changed from the flagged values.

Regarding the 1985 NEDS data, certain States (New Jersey, New York, Texas, and Virginia) were released from providing some actual operating rate data for 1985. Texas was precluded from transmitting any operating data by State statute. Where these data were omitted, the number of warning messages has increased significantly.

Table 5-7 presents the number of rejections and warnings for the 1985 NEDS inventory. The total number of rejection messages was 3,120 for 1985. Warning messages for 1985 numbered 21,177. Considering the caveats regarding 1985 warnings, a significant improvement in the inventory data has resulted from the planning and QC programs implemented for 1985 compared to previous NEDS efforts. The number of remaining rejects were investigated closely. The principal rejection message for both years concerned the use of emission method '0' for SCCs with a non-zero emission factor. For 1985, these messages were the result of continuing additions and improvements of the emission factor file, and not miscoding by the States. Emission factors had been added to the emission factor file after States had submitted their data. Discounting these messages leaves only 31 rejections for 1985.

Part of the 1985 QC effort entailed a review of all warning messages for plants emitting at least 1000 tons in 1985 of SO_2, NO_x, or VOC. These messages have been reviewed by the State air pollution control agencies and the relevant data corrected or validated. Remaining messages represent valid data falling outside standard data ranges, errors in the edit checking program, or warnings for points emitting less than 25 tons per year of SO_2, NO_x, or VOC.

5.2.4.2 Missing Data Items

The analyses indicate that the effort to collect SO_2, NO_x, and VOC emissions estimates from the States for priority plants was successful. For these 2100 plants, over 10,000 SO_2, NO_x, and VOC estimates were collected, and only 830 of these lacked SO_2, NO_x, or VOC emissions estimates from the States. For all 9300 plants in the 1985 NEDS inventory (112 thousand points) the number of missing SO_2, NO_x, or VOC estimates reported rose to 19 percent, reflecting the less rigorous collection and QC effort for plants emitting less than 1000 tons per year of SO_2, NO_x, or VOC. Not all unreported emissions estimates will remain blank, however. NEDS permits point source emissions to be assigned an estimation method code of '3' and left blank (Section 3.1.7). NEDS then calculates emissions based on the SCC emission factor file and the NEDS throughput data. NEDS also calculates emissions which are blank with method codes of '0' or blank.

TABLE 5-7. MAJOR REJECTION AND WARNING MESSAGES FOR PLANTS EMITTING 1000 TONS SO_2, NO_x, OR VOC (1985 NEDS)

MESSAGES	NUMBER
Rejection Messages	
VOC Estimation Method Zero for Non-zero Factor	2,029
NOx Estimation Method Zero for Non-zero Factor	667
SO2 Estimation Method Zero for Non-zero Factor	393
Others	31
TOTAL	3,120
Warning Messages	
Maximum Design Rate Blank	3,770
Stack Parameters Blank	2,002
VOC, NOx, or SO2 Estimation Method Blank for Non-zero Emission Factor	2,147
Operating Rate Blank	4,052
Fuel Parameters Blank (Ash, Sulfur, or Heat Content)	1,306
Others	7,900
TOTAL	21,177

Summaries of missing data items have been prepared for the specialized inventory of plants emitting at least 1000 tons of SO_2, NO_x, or VOC and for the entire 1985 NEDS inventory (Tables 5-8 and 5-9). These tables account for the effect of the missing operating data from Texas, which was prohibited from releasing certain operating parameters. These remaining missing items represent three categories: data intentionally left blank by the States, data not applicable to a particular source, or data which were not available. The first case includes emissions estimates which are designated by the States to be calculated by the NEDS software using State-supplied throughputs and standard emission factors. Inapplicable data include items such as blank stack heights for ground level sources (e.g., fugitives). As explained in Section 4, these data have been reviewed using computerized and manual checks at the State, Regional, and national levels. Large sources of SO_2, NO_x, and VOC have received the most scrutiny and most remaining missing items represent the first and second categories of missing data. This procedure has included re-review by the States of points emitting more than 500 TPY SO_2, NO_x, or VOC with missing location or stack parameters in order to report all available data to the inventory.

A review of missing items designated as priority items by NAPAP reveals that the inventory has been successful in assembling the required NAPAP data set except where States were prohibited by State statute from releasing operating data to EPA. The numbers of missing items range from none for year of record to 21.6 percent for secondary control equipment for priority plants. It is possible that these missing values for control equipment/efficiency should have been reported as zero; this possibility should be subject to further analysis.

Particulate matter (PM) and carbon monoxide (CO) estimates are also available from the data tape, although the reported emissions should be viewed more cautiously than those of the other pollutants. The effort expended to collect and review these data varied widely from State to State, depending upon the States' normal inventory purposes and resources. No consistent effort was made to collect these estimates; PM and CO estimates and related source data (e.g., control equipment) did not fall within the QC effort. For CO and PM, the data base is incomplete and cannot be assessed except where individual

TABLE 5-8. MISSING ITEMS FOR THE 1985 NAPAP EMISSIONS INVENTORY (1000 TON PLANTS, 25 TON POINTS)

NAPAP DATA ITEMS	MISSING ITEMS	
	1985*	Percent*
UTM Zone	8	0.4%
UTM Coordinates	4	0.2%
SIC	86	0.3%
Stack Height	158	0.5%
Stack Diameter	178	0.6%
Stack Temperature	726	2.4%
Stack Gas Flow Rate	220	0.7%
Plume Height	158	0.5%
Boiler Capacity	690	3.8%
Primary Control Equipment# (SO_2, NO_x, VOC)	18,332	19.9%
Secondary Control Equipment# (SO_2, NO_x, VOC)	19,958	21.6%
Control Efficiency# (SO_2, NO_x, VOC)	16,939	18.4%
Percent Annual Throughput	172	0.6%
Complete Normal Operating Schedule	704	2.3%
Emissions Estimate+ (SO_2, NO_x, VOC)	0	0.0%
Estimation Method (SO_2, NO_x, VOC)	6,409	6.9%
Year of Record (Emissions)	0	0.0%
Annual Operating Rate	1,316	5.9%
Maximum Design Rate	1,527	6.9%
Fuel Sulfur Content	807	3.6%
Fuel Ash Content	1,421	6.4%
Fuel Heat Content	1,463	6.6%

Based on 48 contiguous States and the District of Columbia

* Excludes exempted operating data from Texas for 1985

+ Excludes emissions estimates that are calculated by NEDS

# Within NEDS, States may report control equipment as blank to indicate that no information is available to the State or that the status of the control equipment is uncertain; this situation overestimates the number of items actually missed by the inventory process.

TABLE 5-9. MISSING ITEMS FOR THE 1985 NAPAP EMISSIONS INVENTORY (ALL POINTS)

NAPAP DATA ITEMS	MISSING ITEMS	
	1985*	Percent*
UTM Zone	356	3.8%
UTM Coordinates	5,216	2.3%
SIC	1,789	1.6%
Stack Height	13,440	12.0%
Stack Diameter	13,275	11.9%
Stack Temperature	7,557	6.7%
Stack Gas Flow Rate	8,368	7.5%
Plume Height	3,433	3.1%
Boiler Capacity	803	0.7%
Control Equipment+ (SO_2, NO_x, VOC)	196,213	29.2%
Control Efficiency+ (SO_2, NO_x, VOC)	92,819	27.6%
Percent Annual Throughput	2,341	2.1%
Normal Operating Schedule	3,765	3.4%
Emissions Estimate (SO_2, NO_x, VOC)	62,455	18.6%
Estimation Method (SO_2, NO_x, VOC)	24,572	7.3%
Year of Record (Emissions)	0	0.0%
Annual Operating Rate	5,321	3.8%
Maximum Design Rate	9,898	7.1%
Fuel Sulfur Content	1,942	1.4%
Fuel Ash Content	3,445	2.5%
Fuel Heat Content	2,568	1.8%

Based on 48 contiguous States and the District of Columbia

* Excludes exempted operating data from Texas for 1985

+ Within NEDS, States may report control equipment as blank to indicate that no information is available to the State or that the status of the control equipment is uncertain; this situation overestimates the number of items actually missed by the inventory process.

State QC efforts are known. Because PM and CO data are considered less reliable and were not given as high a priority in the inventory process, no summary of these emissions is presented here.

5.2.5 Emissions by Estimation Method Code

One goal of the inventory process was to standardize emissions estimation procedures for the national inventory. A hierarchy of acceptable estimation methods was established (Section 3.1.7) to promote the use of source-specific information (i.e., source tests) or standard emission factors (e.g., AP-42) for the point source inventory.

Each emissions estimate is given an estimation code in NEDS. Code '1' refers to a factor derived from a source test, code '2' signifies a mass balance calculation, code '3' stands for computer calculation using an AP-42 or SCC emission factor, code '4' refers to the State's best judgment where no source-specific test or factor was available, and code '5' signifies a State emission factor applied to sources in the State. In actuality, State factors and AP-42 factors may be identical in many cases; however, use of the '5' code distinguishes emissions that are not computer-calculated, but are based on a standard emission factor. Code '0' signifies that there is no known appropriate emission factor. The State-level distribution of estimation methods used for the 1985 data is contained in Table 5-10, 5-11, and 5-12 for SO_2, NO_x, and VOC, respectively.

Figure 5-1 shows that SO_2 and NO_x estimates display similar patterns. Approximately 50 percent of SO_2 and NO_x emissions were estimated using AP-42 or SCC emission factors (code '3'). State emission factors (code '5') account for 20 and 28 percent of the point source SO_2 and NO_x emissions, respectively.

For VOCs the estimation methods are more evenly distributed. Codes '3' and '5' together encompass 53 percent of emissions, with mass balance used for 24 percent of the emissions.

These statistics show that standard estimation methods were employed in a majority of emissions estimates as judged by percent emissions accounted for by each estimation method. These methods can be tracked either through EPA literature (AP-42 and SCC listings) or State files (test results and State

TABLE 5-10. STATE SO_2 EMISSIONS TOTALS (10^3 TONS) BY ESTIMATION METHOD CODE

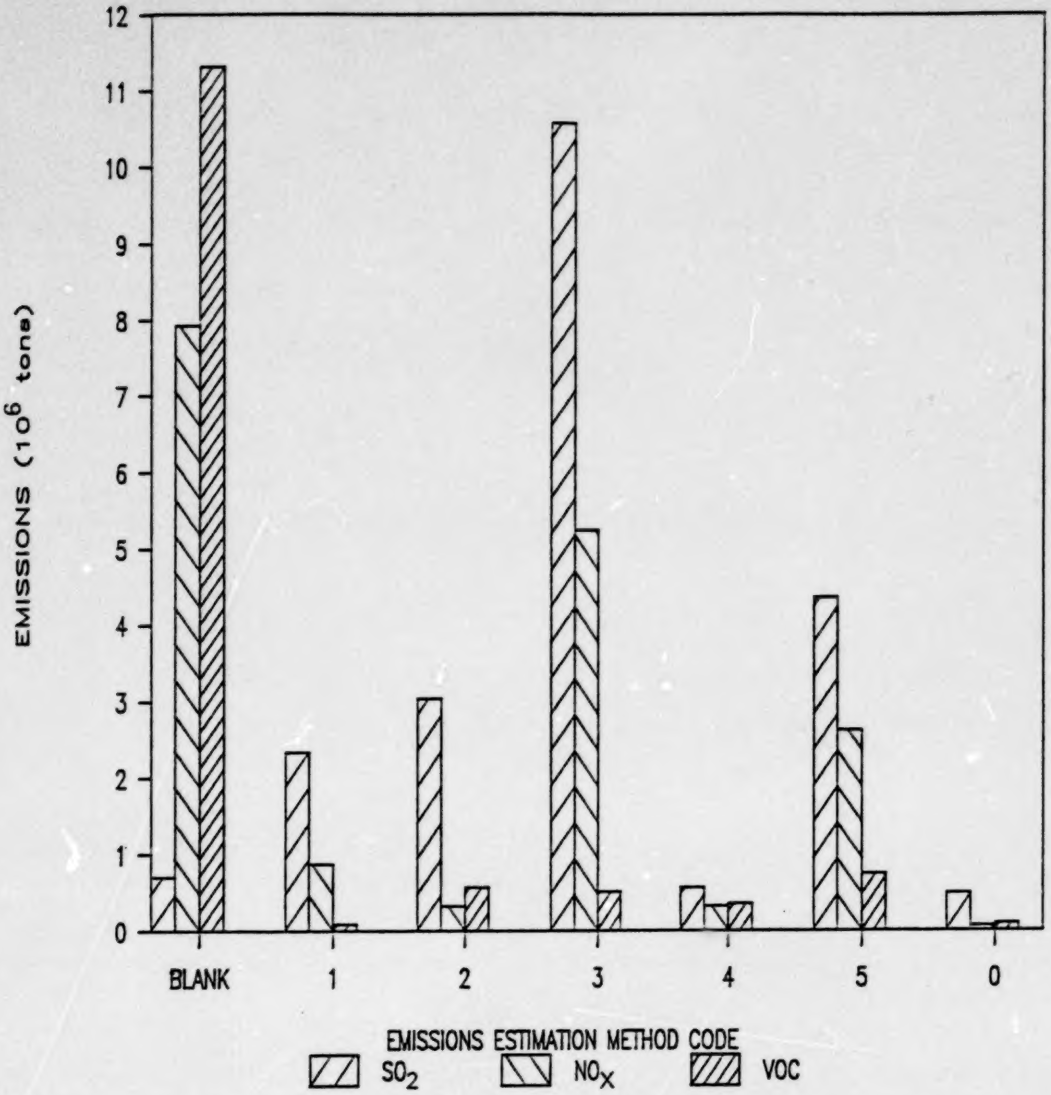
	METHOD CODES						
STATE	BLANK	1	2	3	4	5	0
Alabama	0.0	224.6	219.6	130.6	8.2	104.1	0.0
Arizona	0.0	600.5	0.0	0.0	74.0	0.0	0.0
Arkansas	0.0	60.0	9.5	0.4	0.7	12.5	0.2
California	0.0	10.3	14.5	12.1	0.3	44.0	0.0
Colorado	0.0	0.0	0.0	76.3	0.0	0.0	0.0
Connecticut	0.0	0.0	0.0	0.4	0.0	70.8	0.0
Delaware	0.0	0.0	37.2	76.1	0.0	0.0	439.4
Dist. of Col.	0.0	0.1	0.0	3.7	0.0	0.0	0.0
Florida	0.0	205.9	120.2	233.0	41.2	3.1	10.0
Georgia	0.0	6.8	12.4	9.4	1.0	1,054.8	0.0
Idaho	0.0	19.1	0.0	0.0	0.0	5.2	0.0
Illinois	0.0	11.8	1,245.0	0.0	0.0	104.8	0.0
Indiana	0.6	60.9	0.1	1,581.8	0.0	60.3	0.0
Iowa	0.1	1.1	0.0	244.2	0.0	26.7	0.0
Kansas	0.0	0.0	0.0	144.8	0.0	0.0	0.0
Kentucky	0.0	17.7	0.0	756.3	0.0	53.3	0.0
Louisiana	0.0	69.4	39.3	14.7	2.2	134.6	0.0
Maine	0.0	0.0	0.0	15.0	0.0	52.1	0.0
Maryland	0.0	12.5	2.9	238.2	0.1	0.0	0.0
Massachusetts	0.0	0.2	0.0	26.3	0.0	255.0	0.0
Michigan	0.0	0.0	0.0	22.8	0.0	496.4	0.0
Minnesota	0.0	0.0	0.0	154.5	0.0	0.0	0.2
Mississippi	0.0	111.2	41.1	0.2	0.0	6.5	0.0
Missouri	0.0	66.1	11.0	960.9	0.0	57.2	17.1
Montana	0.0	27.8	43.8	5.9	0.0	0.1	0.2
Nebraska	0.0	0.0	0.0	53.1	0.0	0.0	0.1
Nevada	0.0	16.0	0.0	0.2	0.0	18.1	0.0
New Hampshire	0.0	54.5	0.1	0.2	0.0	25.6	0.0
New Jersey	0.0	2.5	1.7	80.1	18.0	30.7	0.0
New Mexico	0.0	53.2	172.6	23.3	0.0	0.4	0.1
New York	0.0	44.6	216.3	131.8	0.0	178.5	0.0
North Carolina	0.0	4.9	39.3	387.0	0.0	4.7	0.2
North Dakota	0.0	111.5	21.3	0.3	0.0	67.3	0.0
Ohio	0.0	2.3	75.8	2,320.3	0.0	62.3	0.0
Oklahoma	0.0	79.5	24.5	0.0	0.0	14.4	0.0
Oregon	0.0	7.5	0.3	4.4	0.0	0.0	0.0
Pennsylvania	0.0	52.0	9.9	1,270.0	1.0	8.0	17.4
Rhode Island	0.0	1.3	1.3	0.4	0.0	1.0	0.0
South Carolina	0.0	14.2	0.7	202.4	0.0	2.2	0.0
South Dakota	0.0	32.6	0.0	3.8	0.0	0.0	0.0
Tennessee	0.0	20.5	41.4	0.2	0.7	880.3	2.5
Texas	0.0	208.0	43.8	159.4	412.5	431.3	0.0
Utah	0.0	11.7	11.9	27.4	0.0	2.0	0.0
Vermont	0.0	0.0	0.0	1.2	0.0	1.3	0.0
Virginia	0.0	0.0	0.0	204.5	5.7	52.7	0.0
Washington	0.0	80.5	21.9	0.0	0.6	34.5	0.0
West Virginia	0.0	19.4	6.8	1,007.0	3.9	6.2	6.1
Wisconsin	0.0	0.0	492.9	0.0	0.0	0.1	0.0
Wyoming	0.0	51.6	82.6	18.4	0.3	28.2	0.0
TOTAL	0.7	2,374.2	3,065.4	10,602.7	570.5	4,391.6	54.5

TABLE 5-11. STATE NO_x EMISSIONS TOTALS (10^3 TONS) BY ESTIMATION METHOD CODE

	METHOD CODES						
STATE	BLANK	1	2	3	4	5	0
Alabama	3.0	15.8	7.8	220.3	0.0	17.3	0.0
Arizona	0.0	69.9	0.0	0.0	5.5	0.0	0.0
Arkansas	0.0	45.4	6.8	7.7	0.0	6.1	4.9
California	0.0	30.4	1.2	69.4	1.0	128.8	0.0
Colorado	0.0	0.0	0.0	132.2	0.0	0.8	0.0
Connecticut	0.0	0.0	0.2	0.4	0.0	28.7	0.0
Delaware	0.0	0.0	4.8	37.1	0.0	0.0	0.0
Dist. of Col.	0.0	0.3	0.0	1.4	0.0	0.0	0.0
Florida	0.0	47.6	1.9	233.2	1.6	0.7	5.5
Georgia	0.0	3.8	3.4	10.3	0.2	274.8	0.0
Idaho	0.0	1.1	0.0	0.0	0.0	5.4	0.0
Illinois	0.0	9.3	16.3	377.7	0.1	162.0	0.0
Indiana	0.8	33.1	1.9	426.4	0.0	107.4	6.7
Iowa	0.1	0.9	0.0	72.0	0.3	26.0	0.0
Kansas	0.0	13.9	0.0	226.4	0.0	0.0	0.0
Kentucky	0.0	12.0	0.0	212.5	0.0	64.3	0.0
Louisiana	0.0	71.0	3.2	4.9	17.7	335.6	0.0
Maine	0.0	0.0	0.0	2.6	0.0	16.8	0.0
Maryland	0.0	0.0	0.3	93.8	1.8	0.0	0.0
Massachusetts	0.0	0.0	0.0	16.0	0.0	88.4	0.0
Michigan	0.0	0.0	0.0	16.7	0.0	301.9	0.0
Minnesota	0.0	0.0	0.0	154.5	0.0	0.0	0.0
Mississippi	0.0	23.7	2.5	25.2	0.0	23.0	0.0
Missouri	0.0	0.2	4.7	281.7	0.0	0.3	5.4
Montana	0.0	27.6	4.4	4.7	0.0	1.8	1.3
Nebraska	0.0	0.0	0.0	40.2	0.0	0.0	0.0
Nevada	0.0	19.8	0.0	0.1	0.0	42.5	0.0
New Hampshire	0.0	18.5	0.0	0.0	0.0	5.4	0.0
New Jersey	0.0	1.8	2.4	61.9	20.4	27.6	0.0
New Mexico	0.0	7.1	34.6	132.7	0.0	9.6	0.0
New York	0.0	56.0	4.0	68.4	0.0	55.1	0.0
North Carolina	0.0	1.2	12.9	211.3	0.0	8.4	0.1
North Dakota	0.0	68.9	6.7	0.1	0.0	40.2	0.0
Ohio	0.0	2.6	28.0	382.1	0.0	163.3	0.0
Oklahoma	0.0	58.2	10.5	0.1	0.0	86.3	0.0
Oregon	0.0	1.9	0.0	8.9	0.0	0.2	0.0
Pennsylvania	0.0	0.0	1.3	544.2	0.0	1.4	3.2
Rhode Island	0.0	0.0	2.5	0.1	0.0	0.0	0.0
South Carolina	0.0	4.1	0.0	113.9	0.0	0.2	0.0
South Dakota	0.0	13.2	0.0	3.9	0.0	0.0	0.0
Tennessee	0.0	3.9	2.9	0.2	0.0	252.1	18.4
Texas	0.0	102.3	9.7	571.1	274.3	206.0	0.0
Utah	0.0	4.5	0.4	66.8	0.0	15.2	0.0
Vermont	0.0	0.0	0.0	1.6	0.0	0.3	0.0
Virginia	0.0	1.2	0.0	118.5	0.0	19.2	0.0
Washington	0.0	1.6	0.1	0.0	0.2	71.4	0.0
West Virginia	4.0	22.4	0.1	315.8	1.4	32.1	5.9
Wisconsin	0.0	0.0	149.5	0.0	0.0	0.0	0.0
Wyoming	0.0	85.9	0.0	4.4	0.0	30.6	0.0
TOTAL	7.9	881.3	325.0	5,267.5	324.7	2,658.5	53.3

TABLE 5-12. STATE VOC EMISSIONS TOTALS (10^3 TONS) BY ESTIMATION METHOD CODE

	METHOD CODES						
STATE	BLANK	1	2	3	4	5	0
Alabama	9.2	4.1	37.5	23.0	0.1	0.0	0.4
Arizona	0.0	0.3	0.0	0.0	3.4	0.0	0.0
Arkansas	0.0	1.4	9.5	1.2	0.0	8.1	2.7
California	0.0	1.3	8.5	12.1	2.3	72.9	0.0
Colorado	0.0	0.0	0.2	5.2	0.0	0.7	0.0
Connecticut	0.0	0.0	2.7	0.5	0.0	1.2	0.0
Delaware	0.2	0.0	7.4	0.2	0.0	0.0	0.0
Dist. of Col.	0.0	0.0	0.5	0.1	0.0	0.0	0.0
Florida	0.0	2.7	2.7	8.4	0.3	0.1	2.8
Georgia	0.0	0.6	12.6	2.0	0.4	20.1	0.0
Idaho	0.0	0.1	0.0	0.0	0.0	1.0	0.0
Illinois	0.0	6.4	92.8	0.0	6.0	58.6	0.0
Indiana	1.2	0.0	14.7	50.2	0.0	25.7	3.3
Iowa	0.0	3.6	0.0	3.3	0.4	0.1	0.0
Kansas	0.0	0.0	0.0	27.4	1.8	3.2	0.0
Kentucky	0.0	0.0	6.2	2.7	0.2	49.2	0.0
Louisiana	0.0	14.2	19.3	0.2	7.4	87.5	0.0
Maine	0.0	0.0	0.0	0.4	0.0	5.5	0.0
Maryland	0.0	0.0	3.1	6.2	4.6	0.0	0.0
Massachusetts	0.0	0.0	2.4	6.0	0.0	29.0	0.0
Michigan	0.0	0.0	0.0	13.3	0.0	81.0	0.0
Minnesota	0.0	0.0	9.2	39.9	0.0	0.0	0.2
Mississippi	0.0	0.0	3.9	7.2	0.0	25.1	0.0
Missouri	0.0	0.1	13.8	59.3	0.4	6.7	4.0
Montana	0.0	0.0	3.8	2.3	0.0	0.8	0.7
Nebraska	0.0	0.0	0.0	4.1	0.0	0.0	0.0
Nevada	0.0	0.0	0.0	0.4	0.0	0.2	0.0
New Hampshire	0.0	0.2	2.1	0.0	0.0	2.0	0.0
New Jersey	0.0	0.3	7.0	4.6	24.9	5.1	0.0
New Mexico	0.0	0.0	0.3	18.4	0.0	2.7	0.1
New York	0.0	7.5	17.3	5.8	0.0	22.8	0.0
North Carolina	0.0	0.1	54.2	18.2	0.5	1.0	0.1
North Dakota	0.0	1.3	0.1	0.0	0.0	1.5	0.0
Ohio	0.0	2.5	53.2	13.7	0.3	25.1	0.0
Oklahoma	0.0	0.3	10.3	0.0	0.0	21.2	0.0
Oregon	0.0	3.2	4.9	3.5	0.0	1.1	0.0
Pennsylvania	0.0	1.4	13.2	50.4	0.5	5.2	4.9
Rhode Island	0.0	0.0	5.1	0.2	0.0	0.7	0.0
South Carolina	0.0	0.0	7.2	18.7	0.0	0.0	0.0
South Dakota	0.0	0.0	4.2	1.4	0.0	0.1	0.0
Tennessee	0.0	2.9	60.1	1.5	0.2	29.4	2.4
Texas	0.0	24.6	34.3	81.7	279.7	30.2	0.0
Utah	0.0	0.4	0.0	9.2	0.0	6.6	0.0
Vermont	0.0	0.0	0.8	1.0	0.0	0.0	0.0
Virginia	0.0	0.0	0.0	2.5	0.0	84.2	0.0
Washington	0.0	3.8	0.3	0.0	0.2	25.3	0.0
West Virginia	0.7	1.1	5.8	6.2	22.2	1.1	41.8
Wisconsin	0.0	0.0	49.2	0.0	0.0	0.4	0.0
Wyoming	0.0	2.0	0.0	0.8	0.6	14.4	0.0
TOTAL	11.3	86.3	580.6	513.1	356.5	757.5	77.7



1 = Source-test Derived
2 = Mass Balance
3 = AP-42 or SCC Factor
4 = State Judgment
5 = State Emission Factor

Figure 5-1. Distribution of SO_2, NO_x, and VOC emissions by method code.

factors). Relatively few SO_2 emission estimates (2.6 percent) and NO_x emission estimates (3.5 percent) indicated method code '4' or a blank. The VOC estimates, however, have method codes of blank or '4' for 15.4 percent of the reported emissions.

5.3 EMISSIONS SUMMARY AND CONCLUSIONS

To reiterate, this presentation highlights major features evident from the 1985 NAPAP Emissions Inventory data. Data for SO_2, NO_x, VOC, and four noncriteria pollutants are summarized. The summaries provided herein are meant to communicate the content of the data base and the types of analysis possible through the inventory, as well as provide useful abstracts of the data to the inventory community. Those in the NAPAP program should use the presentations as guides to more detailed and individual analyses of the inventory, as well as a benchmark for accessing the 1985 NAPAP Emissions Inventory.

Most data are summarized here at the State level for the review and use of State personnel who were responsible for conducting the inventory at the source level. Data are presented principally through tabular and graphical formats; the text describes major results and explains limitations or inconsistencies in the analysis. The criteria pollutant summaries are arranged by pollutant and by emissions source category. Where appropriate, the distinction between point and area sources is maintained. These summaries should not be viewed as discrete entities unrelated to each other or to the major features of the study. Conclusions have been drawn from these data which are related to the major 1985 trends displayed by the inventory emissions summaries.

The summaries have been divided into three groups:

- SO_2, NO_x, and VOC emissions summaries by emissions source categories for each State;
- Detailed emissions summaries for areas of special interest including combustion sources, VOC emissions, primary and secondary smelting, and emissions by stack height; and
- Preliminary noncriteria pollutant estimates.

Only SO_2, NO_x, and VOC emissions are considered in the criteria pollutant analysis, as these were the pollutants of greatest interest to NAPAP. The inventory also contains PM and CO emissions, which are not presented here. PM and CO emissions estimates have a lower degree of reliability due to the lower priority placed on their collection from the States. Noncriteria emissions (Section 3.3) of primary sulfates, hydrogen chloride, hydrogen fluoride, and ammonia are presented as preliminary estimates. These emissions were estimated by EPA at the request of both NAPAP and the Western Governors' Association. Estimates of noncriteria pollutants should be considered less reliable due to the methods necessary for their estimation.

Emissions in the inventory are reported in tons per year (TPY) on a point-by-point basis. However, emissions are allocated within NEDS to the process (SCC) level based on operating throughputs, a practice which introduces fractional tonnages into the data base. As a result, emissions totals herein may differ slightly from table to table due to rounding.

From the emissions summaries provided below, several interesting features of the data are evident:

- SO_2, NO_x, and VOC are emitted in roughly equal amounts from anthropogenic sources: 23.0 million tons SO_2, 20.6 million tons NO_x, and 22.3 million tons VOC.

- The primary source of SO_2 emissions is utilities, contributing 16.2 million tons of SO_2; 91 percent of utility SO_2 comes from the combustion of bituminous coal, released primarily from a relative few tall stacks.

- NO_x emissions are divided approximately equally between point (9.5 million tons) and area (11.1 million tons) sources; fuel combustion accounts for 90 percent of the point emissions, including 60 percent of combustion NO_x from bituminous coal, and mobile sources account for 80 percent of area source NO_x.

- VOCs are predominantly reported in area source categories (90 percent) and are emitted from mobile sources (37 percent of the area total) and non-combustion point sources too small to be included individually in the point source category; these small sources contribute 45 percent of the area source total VOC and represent a diffuse and diverse population.

5.3.1 U.S. Emissions by Category and State

Tables in Appendix C provide SO_2, NO_x, and VOC emissions summaries for the 48 contiguous States and the District of Columbia. The table format has been condensed from that used for the U.S. totals found in Table 1-2 (Section 1). These tables are based on a standard NEDS data retrieval program (NE204). The descriptive categories are based on SCC groupings. Summarizations of emissions and categories are consistent between States and should be reproducible using the 1985 NAPAP Emissions Inventory data.

As noted, categories found in Table 1-2 have been combined to reduce the volume of this report. The grouping does not affect the resolution of any major emissions category, does account for total State emissions, and is designed to preserve the integrity of the data. The distinction between point and area source emissions has been maintained.

These descriptive emissions categories may not provide sufficient detail for benchmark comparison with the complete inventory data tape. For this reason, a six-digit SCC emissions summary for the nation has been included as Appendix D. The Appendix also contains three-digit area source categories and emissions. A standard listing of area source categories is also included. The point source SCC descriptions at the full eight-digit level cover more than 3300 source categories which cannot be listed here.

5.3.2 Emissions for Selected Emission Categories

It is useful to summarize emissions by certain categories or data items available from the inventory. These retrievals may be of particular interest to the assessment and modeling communities. The categories presented here represent the major sources of SO_2, NO_x, and VOC emissions:

- Combustion sources (SO_2 and NO_x),
- Primary and secondary metals (SO_2),
- Major VOC emission sources,
- Area sources, and
- Emissions by stack height.

5.3.2.1 Combustion Sources

Utility, Industrial, and Commercial/Institutional Emissions--External combustion boilers in the point source inventory contribute more than 78 percent of total U.S. SO_2 and 38 percent of total NO_x (83 percent of point source NO_x). External combustion boilers have been divided into the utility, industrial, and commercial/institutional sectors for this analysis. Residential boilers are represented among area sources. All boilers account for a small portion of VOC emissions in the U.S. Emissions are summarized in Tables 5-13, 5-14, and 5-15.

Boilers inventoried individually in the 1985 data base are those emitting more than 25 tons of SO_2, NO_x, or VOC at plants emitting at least 100 tons of one of the pollutants, as reported by the States. A single boiler (point) may also represent two or more similar boilers at one plant that have been grouped for inclusion to the point source inventory. Boilers falling below the emissions level criteria are included under area sources. Boilers enumerated in this manner in the point source inventory total 4,600 utility, 17,000 industrial, and 3,400 commercial/institutional.

Utility boilers emit 89 percent of SO_2 (16.2 million tons) and 86 percent of NO_x (6.7 million tons) among all boilers (Figure 5-2). The majority of these emissions are from utilities in the multi-State region of the Ohio Valley. Because of the large amount of SO_2 and NO_x accounted for by utility boilers, the principal fuels burned provide a further insight into these emissions sources.

Utility Emissions by Fuel Type--Utility emissions for major fuel types are presented in Table 5-16. Coal emissions include lignite, bituminous and anthracite coals. Emissions from oil combustion include both residual and distillate oils. These totals do not match those in 5.3.1 because a few minor fuels such as wood bark are not considered here.

This table shows that coal is the predominant fuel in terms of both SO_2 and NO_x emissions. Bituminous coal represents more than 95 percent of the coal burned and produces 95 percent of SO_2 and NO_x emissions from the coal category. Lignite does represent the major utility fuel in a few States, namely, North

TABLE 5-13. EMISSIONS FROM UTILITY BOILERS OF SO_2, NO_x, AND VOC BY STATE (10^3 TONS)

STATE	BOILERS*	SO_2	NO_x	VOC
Alabama	63	532.3	202.0	6.7
Arizona	59	117.8	71.7	1.9
Arkansas	19	60.4	49.5	0.1
California	263	4.5	45.5	0.9
Colorado	44	66.6	111.3	0.5
Connecticut	56	60.9	23.4	0.3
Delaware	21	59.1	29.5	0.1
Dist. of Col.	4	0.7	0.3	0.0
Florida	275	526.7	247.2	1.4
Georgia	66	998.1	232.5	1.0
Idaho	1	0.0	0.1	0.1
Illinois	129	1,016.3	425.3	5.2
Indiana	204	1,515.5	471.4	1.4
Iowa	104	196.1	76.1	0.4
Kansas	76	103.6	149.4	0.5
Kentucky	69	769.9	261.6	1.0
Louisiana	200	79.4	171.6	1.2
Maine	10	10.4	4.9	0.1
Maryland	99	211.7	67.8	0.3
Massachusetts	119	251.8	83.6	0.5
Michigan	205	413.0	252.0	1.0
Minnesota	192	117.4	126.0	0.4
Mississippi	49	102.8	40.5	0.2
Missouri	150	966.5	255.6	0.8
Montana	10	16.3	25.6	0.3
Nebraska	30	47.1	35.0	0.3
Nevada	24	32.7	61.2	0.3
New Hampshire	12	74.2	21.7	0.4
New Jersey	61	77.2	63.6	0.4
New Mexico	39	77.9	108.0	0.7
New York	136	409.6	118.1	2.0
North Carolina	67	353.4	195.3	0.9
North Dakota	23	144.9	104.7	1.2
Ohio	221	2,241.5	494.4	1.6
Oklahoma	86	82.1	76.1	1.3
Oregon	3	2.5	1.6	0.1
Pennsylvania	198	1,185.4	461.2	1.6
Rhode Island	8	2.3	1.6	0.0
South Carolina	46	144.6	82.3	0.3
South Dakota	7	33.7	15.7	0.1
Tennessee	59	804.9	197.0	0.8
Texas	794	578.5	550.4	11.3
Utah	23	24.4	53.5	0.3
Vermont	11	1.2	0.9	0.8
Virginia	84	134.3	77.9	0.2
Washington	22	68.8	38.3	0.6
West Virginia	58	931.7	316.7	1.1
Wisconsin	142	379.6	111.4	0.7
Wyoming	34	138.0	91.0	0.8
TOTAL	4,675	16,168.4	6,702.1	54.1

* Number of boilers reported by the States as point sources

TABLE 5-14. EMISSIONS FROM INDUSTRIAL BOILERS OF SO_2, NO_x, AND VOC BY STATE (10^3 TONS)

STATE	BOILERS*	SO_2	NO_x	VOC
Alabama	304	54.0	32.9	8.5
Arizona	20	0.1	0.6	0.1
Arkansas	120	7.0	10.4	1.8
California	2,069	28.2	52.6	3.4
Colorado	40	3.9	2.9	0.1
Connecticut	130	7.4	3.0	0.0
Delaware	113	22.4	9.6	0.1
Dist. of Col.	2	0.1	0.0	0.0
Florida	255	21.5	14.2	4.5
Georgia	450	49.2	40.4	7.4
Idaho	47	3.1	4.2	0.6
Illinois	809	145.4	70.7	2.1
Indiana	611	82.3	39.0	0.3
Iowa	215	55.1	13.9	0.0
Kansas	88	4.1	10.0	0.0
Kentucky	112	22.0	9.1	0.5
Louisiana	850	47.8	79.0	4.5
Maine	182	49.5	12.4	2.5
Maryland	269	20.8	10.8	0.2
Massachusetts	548	21.8	8.4	1.7
Michigan	486	51.4	36.9	0.8
Minnesota	441	15.8	11.9	0.7
Mississippi	72	7.4	9.7	1.8
Missouri	193	18.2	4.9	0.0
Montana	42	4.7	2.4	0.9
Nebraska	19	1.4	1.4	0.0
Nevada	0	0.0	0.0	0.0
New Hampshire	77	5.2	1.7	0.5
New Jersey	291	11.4	14.0	0.1
New Mexico	35	0.3	1.8	2.3
New York	416	107.3	35.2	6.9
North Carolina	651	64.1	27.4	1.4
North Dakota	25	24.7	4.2	0.2
Ohio	658	140.6	45.0	1.1
Oklahoma	160	7.2	7.5	0.4
Oregon	65	2.8	6.6	1.9
Pennsylvania	712	79.7	31.6	0.5
Rhode Island	5	0.5	0.2	0.0
South Carolina	301	46.9	28.7	1.5
South Dakota	5	0.1	0.3	0.1
Tennessee	680	91.8	37.4	4.7
Texas	2,512	140.3	184.3	8.0
Utah	40	9.6	10.9	0.1
Vermont	42	1.2	0.3	0.0
Virginia	719	86.3	39.5	1.6
Washington	292	17.1	18.2	2.8
West Virginia	267	65.0	30.4	0.1
Wisconsin	659	93.7	31.5	3.5
Wyoming	57	15.0	14.6	0.3
TOTAL	17,156	1,755.3	1,062.6	80.7

* Number of boilers reported by the States as point sources

TABLE 5-15. EMISSIONS FROM COMMERCIAL/INSTITUTIONAL BOILERS OF SO2, NOx, AND VOC BY STATE (10^3 TONS)

STATE	BOILERS*	SO_2	NO_x	VOC
Alabama	11	0.1	0.2	0.1
Arizona	2	0.0	0.2	0.0
Arkansas	1	0.0	0.0	0.0
California	91	0.7	1.1	0.0
Colorado	34	1.2	4.8	0.1
Connecticut	76	2.6	1.1	0.0
Delaware	40	0.8	0.3	0.0
Dist. of Col.	37	2.8	1.3	0.0
Florida	6	0.3	0.2	0.0
Georgia	23	0.9	1.0	0.0
Idaho	5	0.3	0.2	0.0
Illinois	100	17.1	5.2	0.2
Indiana	92	23.0	2.6	0.0
Iowa	25	13.5	1.6	0.0
Kansas	0	0.0	0.0	0.0
Kentucky	13	1.9	0.6	0.0
Louisiana	10	0.0	0.3	0.0
Maine	41	2.2	0.6	0.0
Maryland	245	3.9	1.7	0.0
Massachusetts	211	3.7	1.8	0.1
Michigan	88	5.9	4.1	0.0
Minnesota	90	3.5	2.6	0.0
Mississippi	3	0.1	0.6	0.2
Missouri	38	4.1	0.6	0.0
Montana	1	0.0	0.0	0.0
Nebraska	18	0.1	0.2	0.0
Nevada	0	0.0	0.0	0.0
New Hampshire	28	0.9	0.3	0.1
New Jersey	63	1.1	1.0	0.0
New Mexico	6	0.3	0.1	0.0
New York	183	21.8	14.1	0.5
North Carolina	98	4.9	1.7	0.0
North Dakota	9	0.9	0.7	0.2
Ohio	130	20.7	3.9	0.4
Oklahoma	7	0.0	0.1	0.0
Oregon	8	0.3	0.1	0.1
Pennsylvania	143	7.9	2.0	0.1
Rhode Island	40	0.9	0.5	0.0
South Carolina	4	1.1	0.1	0.0
South Dakota	2	0.2	0.1	0.0
Tennessee	34	3.1	0.9	0.2
Texas	1,054	0.3	8.4	0.2
Utah	15	0.6	0.7	0.0
Vermont	11	0.1	0.0	0.0
Virginia	229	8.6	2.1	0.0
Washington	26	2.6	1.1	0.1
West Virginia	15	1.3	0.1	0.0
Wisconsin	67	3.3	0.7	0.0
Wyoming	5	0.3	0.1	0.0
TOTAL	3,478	169.8	71.6	3.0

* Number of boilers reported by the States as point sources

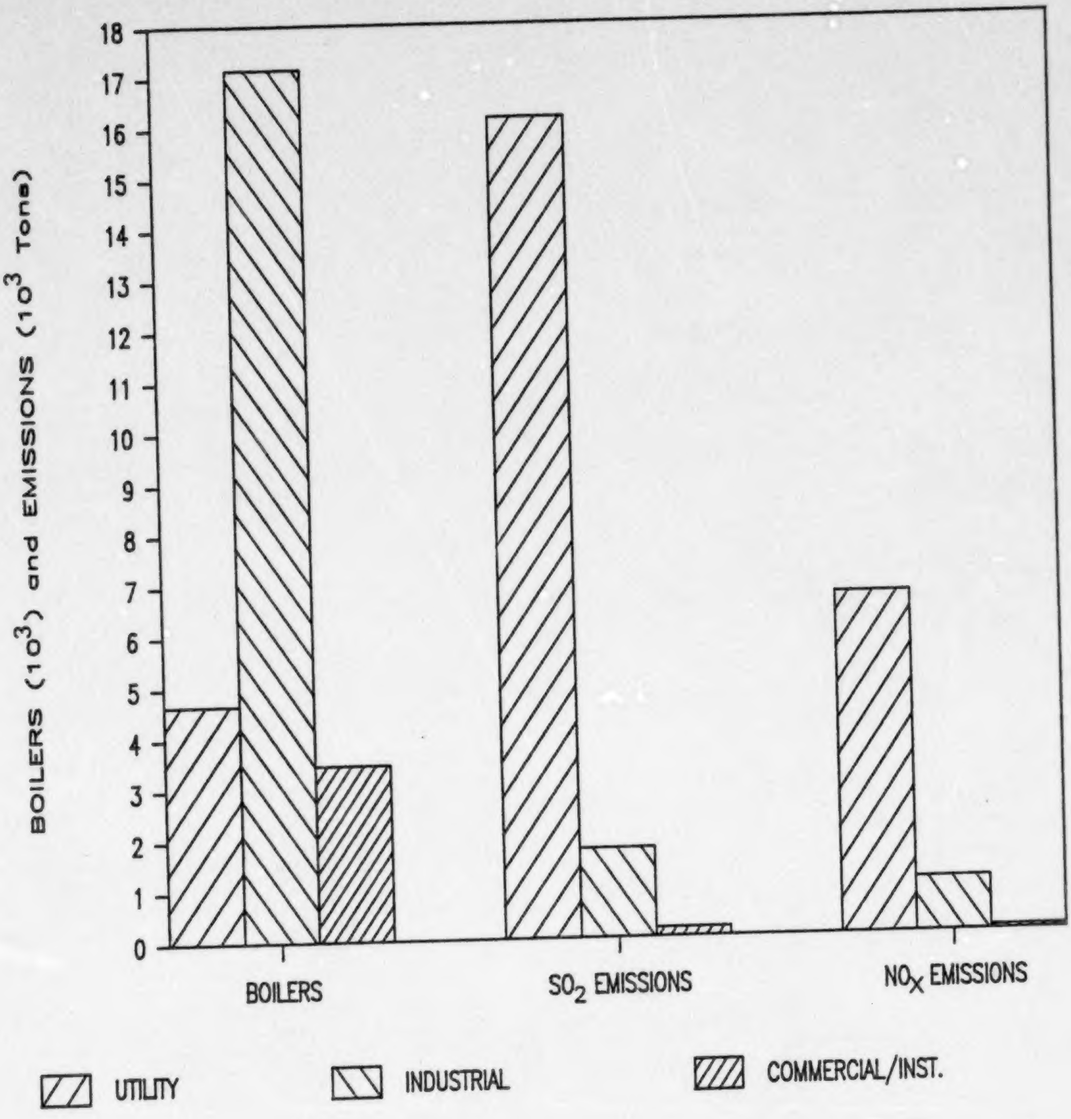


Figure 5-2. 1985 emissions by boiler category (SO_2 and NO_x).

TABLE 5-16. 1985 UTILITY EMISSIONS (10^3 TONS) OF SO_2 and NO_x BY FUEL TYPE

STATE	COAL		OIL		NATURAL GAS	
	SO_2	NO_x	SO_2	NO_x	SO_2	NO_x
Alabama	532.0	201.4	0.5	0.3	0.0	0.2
Arizona	117.4	69.1	0.4	0.7	0.0	2.5
Arkansas	60.3	47.9	0.1	0.0	0.0	1.5
California	0.0	0.0	2.9	3.1	1.8	46.1
Colorado	66.6	109.8	0.1	0.2	0.0	1.8
Connecticut	10.5	7.0	50.4	16.3	0.0	0.2
Delaware	48.9	25.5	10.1	3.6	0.0	0.2
Dist. of Col.	0.0	0.0	0.7	0.3	0.0	0.0
Florida	430.5	182.3	100.1	30.4	0.2	41.3
Georgia	997.2	230.7	0.9	0.2	0.0	1.6
Idaho	0.0	0.0	0.0	0.0	0.0	0.0
Illinois	1,007.7	415.8	10.2	10.1	0.0	3.8
Indiana	1,515.2	471.0	0.3	0.2	0.0	0.2
Iowa	196.0	75.6	0.0	0.0	0.0	0.4
Kansas	103.5	145.9	0.1	0.5	0.0	9.9
Kentucky	769.8	261.3	0.0	0.0	0.0	0.3
Louisiana	61.1	66.8	17.9	12.0	0.4	93.0
Maine	0.0	0.0	10.4	4.9	0.0	0.0
Maryland	191.1	59.8	20.7	7.7	0.0	1.3
Massachusetts	105.3	45.9	146.9	30.0	0.0	9.2
Michigan	412.1	248.5	0.9	0.9	0.0	2.9
Minnesota	101.9	124.0	0.0	0.0	0.0	0.5
Mississippi	102.1	29.5	0.6	0.1	0.0	11.1
Missouri	966.2	255.4	0.2	0.1	0.0	0.7
Montana	16.3	25.4	0.0	0.0	0.0	0.0
Nebraska	47.1	34.9	0.0	0.1	0.0	0.4
Nevada	32.7	60.1	0.0	0.0	0.0	1.1
New Hampshire	60.4	19.1	13.8	2.6	0.0	0.0
New Jersey	67.0	36.1	10.7	28.2	0.1	0.9
New Mexico	77.9	102.9	0.4	1.1	0.0	4.9
New York	219.8	56.8	189.8	39.9	0.1	21.4
North Carolina	351.0	194.4	0.9	0.3	0.0	0.0
North Dakota	144.9	104.7	0.0	0.0	0.0	0.4
Ohio	2,240.6	493.6	0.9	0.4	0.0	0.1
Oklahoma	82.0	47.6	0.1	2.6	0.0	30.6
Oregon	2.5	1.5	0.0	0.0	0.0	0.0
Pennsylvania	1,151.2	443.8	30.8	17.0	0.0	0.2
Rhode Island	0.0	0.0	2.3	0.9	0.0	0.7
South Carolina	144.6	82.1	0.0	0.1	0.0	0.1
South Dakota	32.9	14.0	0.7	1.0	0.0	0.6
Tennessee	801.3	196.2	5.6	4.5	0.0	0.0
Texas	546.0	342.1	26.5	14.5	4.8	209.7
Utah	24.3	52.9	0.0	0.0	0.1	0.6
Vermont	1.1	0.2	0.0	0.0	0.0	0.0
Virginia	130.3	76.4	4.0	1.3	0.0	0.2
Washington	68.8	37.4	0.0	0.0	0.0	0.0
West Virginia	931.5	316.5	0.2	0.1	0.0	0.0
Wisconsin	379.4	110.3	0.1	0.0	0.0	0.7
Wyoming	137.9	90.7	0.1	0.1	0.0	0.2
TOTALS	15,487.2	6,012.7	661.7	236.4	7.5	501.4

and South Dakota, Texas, and Washington. Comparison of Table 5-17 and Appendix C shows the correlation between State emissions of SO_2 and NO_x and State emissions from utility coal combustion. As stated, 96 percent of total utility boiler emissions of SO_2 and 90 percent of NO_x are accounted for by coal combustion.

5.3.2.2 Primary and Secondary Metals

In certain States, primary and secondary metal smelting has historically represented a significant source of SO_2 emissions. Emissions are listed in Appendix C (and Table 1-2) under Industrial Process. A more detailed accounting is contained in Table 5-17. Of one million tons of SO_2 emitted by smelters in 1985, 70 percent was emitted from aluminum and copper smelting (700 thousand tons). Although this amount represents only a small fraction of the total U.S. SO_2 emissions, a few points within three States contribute nearly all these emissions. Iron and steel production contributed 144 thousand tons of SO_2 in 1985. Blanks in Table 5-17 represent States reporting no emissions from the indicated smelter type.

5.3.2.3 VOC Emissions

Obtaining VOC emissions data was a major goal for this inventory collection effort. Twenty-two million tons of VOCs were emitted by anthropogenic point and area sources in 1985. These totals do not include emissions of the non-reactive VOCs defined by EPA. Tables 5-18, 5-19, and 5-20 summarize major VOC categories on a State basis for point sources, area sources, and totals, respectively. Prior to 1985, many SCCs lacked VOC emission factors. EPA has now developed additional VOC emission factors and applied these factors to source categories for which VOC emissions previously could not be estimated. Figure 5-3 presents the results graphically. The six major categories correspond to those in the standard NEDS data retrieval program (NE205) and group data from the following sources (both point and area):

TABLE 5-17. PRIMARY AND SECONDARY SMELTING SO_2 EMISSIONS (10^3 TONS) BY STATE

STATE	ALUMINUM	COPPER	IRON AND STEEL	OTHER METALS	TOTAL
Alabama	0.4		2.5	4.6	7.5
Arizona		500.9			500.9
Arkansas	0.0		0.0		0.0
California	0.0		0.1	0.0	0.2
Colorado					
Connecticut					
Delaware					
Distr. of Col.					
Florida				1.4	
Georgia		0.3		1.2	1.5
Idaho					
Illinois		0.0	7.9		7.9
Indiana	8.0	0.0	31.7	6.6	46.3
Iowa	0.0		0.0		0.0
Kansas					
Kentucky	6.8		0.6		7.4
Louisiana	11.3		0.1	1.0	12.4
Maine					
Maryland	0.2		6.1		6.3
Massachusetts			0.0		0.0
Michigan	0.0	0.0	6.1		6.1
Minnesota			0.0	0.5	0.5
Mississippi					
Missouri	4.7		0.3	65.6	70.7
Montana	1.8			26.2	28.0
Nebraska					
Nevada					
New Hampshire					
New Jersey					
New Mexico		106.5			106.5
New York			4.6		4.6
North Carolina	0.1		0.0		0.2
North Dakota					
Ohio	1.7	0.0	9.0	3.0	13.6
Oklahoma					
Oregon	1.4			0.3	1.7
Pennsylvania	0.0		26.0	6.2	32.2
Rhode Island					
South Carolina	0.2		0.0	0.5	0.7
South Dakota					
Tennessee	4.1	3.6	10.5	1.8	20.0
Texas	3.8	16.5	6.7	11.1	38.0
Utah		9.2	1.9	0.0	11.1
Vermont					
Virginia		0.0	5.7		5.7
Washington	14.6	0.0	0.9	0.2	15.8
West Virginia	2.9		22.0		25.0
Wisconsin			0.4		0.4
Wyoming			0.9		0.9
TOTAL	62.1	637.0	144.0	130.3	973.4

TABLE 5-18. VOC POINT SOURCE EMISSIONS (10^3 TONS) BY STATE AND CATEGORY

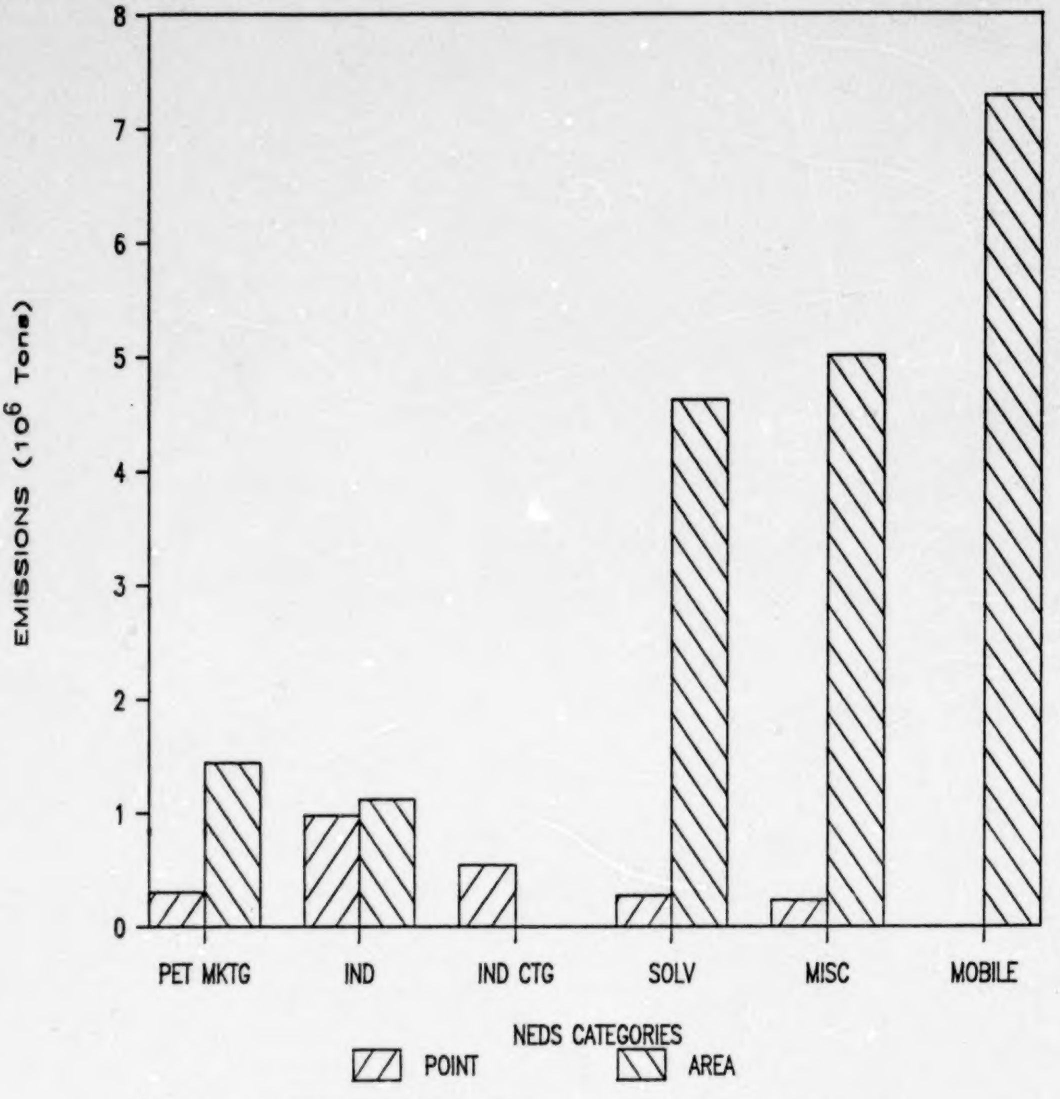
STATE	PETROLEUM MARKETING	INDUSTRIAL	INDUSTRIAL COATING	OTHER SOLVENT USE	MISC.
Alabama	1.9	39.1	16.8	0.5	15.8
Arizona	0.6	0.5	0.0	0.3	2.2
Arkansas	2.4	13.9	4.3	0.1	2.2
California	14.8	31.8	27.8	10.8	11.5
Colorado	1.9	0.8	0.7	1.5	1.2
Connecticut	0.6	2.2	1.0	0.0	0.6
Delaware	0.4	1.8	5.4	0.0	0.2
Dist. of Col.	0.0	0.0	0.0	0.5	0.1
Florida	2.1	4.8	1.2	0.8	8.1
Georgia	3.6	12.1	11.3	0.7	8.4
Idaho	0.3	0.0	0.0	0.0	0.7
Illinois	26.9	43.1	50.2	30.4	13.4
Indiana	4.5	38.6	34.0	15.5	2.7
Iowa	0.0	2.9	1.9	2.1	0.5
Kansas	11.3	11.4	4.5	3.0	2.4
Kentucky	5.6	36.3	9.4	3.8	2.5
Louisiana	29.6	78.4	2.0	0.5	18.3
Maine	0.3	3.1	0.0	0.0	2.6
Maryland	2.0	2.5	5.0	3.6	0.7
Massachusetts	5.6	2.1	21.0	5.8	3.3
Michigan	5.7	17.6	43.9	22.9	4.4
Minnesota	7.6	7.2	30.8	2.3	1.4
Mississippi	12.9	6.0	5.9	2.4	5.4
Missouri	1.3	41.7	28.0	11.6	1.3
Montana	2.5	3.8	0.0	0.0	1.3
Nebraska	1.6	0.0	1.7	0.5	0.3
Nevada	0.1	0.0	0.0	0.0	0.3
New Hampshire	0.1	0.9	1.2	1.1	1.0
New Jersey	15.9	11.2	10.1	3.6	1.2
New Mexico	3.3	0.2	0.0	0.0	18.1
New York	4.0	27.8	4.7	0.1	10.0
N. Carolina	4.4	28.2	23.9	14.5	3.0
N. Dakota	0.1	0.3	0.0	0.0	2.5
Ohio	2.7	28.0	44.7	15.8	3.8
Oklahoma	9.8	8.3	1.8	1.8	10.1
Oregon	0.2	4.1	5.9	0.6	2.0
Pennsylvania	8.3	25.9	23.7	14.3	3.4
Rhode Island	0.1	0.7	2.8	2.3	0.0
S. Carolina	0.8	6.3	11.6	5.4	1.9
S. Dakota	1.1	0.1	4.0	0.0	0.3
Tennessee	1.1	58.3	18.8	8.5	6.7
Texas	85.3	301.7	14.6	8.1	34.0
Utah	8.7	2.5	0.3	0.2	4.3
Vermont	0.0	0.0	0.8	0.3	0.8
Virginia	4.8	14.6	16.5	48.3	2.5
Washington	6.2	10.5	5.4	0.5	6.9
West Virginia	1.5	38.1	25.4	12.1	1.7
Wisconsin	0.4	3.3	25.7	15.6	4.4
Wyoming	2.4	10.9	0.0	0.0	3.6
Totals	307.3	983.5	548.3	272.7	233.8

TABLE 5-19. VOC AREA SOURCE EMISSIONS (10^3 TONS) BY STATE AND CATEGORY

State	PETROLEUM MARKETING	INDUSTRIAL	OTHER SOLVENT USE	MOBILE SOURCES	MISC.
Alabama	29.0	12.1	74.4	142.5	178.0
Arizona	14.9	0.0	50.9	107.9	48.0
Arkansas	19.8	6.2	50.5	87.1	2.2
California	140.3	123.1	526.5	809.9	414.8
Colorado	27.8	3.6	54.5	147.0	55.6
Connecticut	0.0	3.2	82.5	75.1	50.1
Delaware	5.6	11.9	12.9	21.0	9.2
Dist. of Col.	2.9	0.0	8.9	14.1	1.6
Florida	65.5	14.5	182.7	353.5	104.0
Georgia	41.8	12.0	121.7	213.1	163.2
Idaho	0.0	0.0	14.5	41.9	126.3
Illinois	65.0	49.2	250.3	290.1	138.6
Indiana	37.0	27.5	132.2	174.5	107.7
Iowa	22.0	0.6	49.4	99.0	27.3
Kansas	28.3	18.3	45.6	91.5	27.9
Kentucky	26.8	13.6	59.7	119.2	148.3
Louisiana	44.8	135.1	59.5	146.0	132.0
Maine	8.4	0.0	22.9	35.7	98.2
Maryland	25.9	1.1	72.9	123.1	20.5
Massachusetts	0.0	1.7	148.7	130.3	71.8
Michigan	51.9	18.0	209.1	265.4	11.1
Minnesota	30.5	12.1	84.6	156.7	97.3
Mississippi	21.6	19.8	47.5	88.3	61.7
Missouri	38.0	5.5	102.5	163.7	113.9
Montana	4.7	6.9	9.4	48.5	12.0
Nebraska	0.0	0.3	25.5	63.7	14.2
Nevada	4.9	0.2	13.7	41.1	15.7
New Hampshire	6.1	0.7	26.5	23.8	24.0
New Jersey	38.9	37.2	174.2	182.4	110.9
New Mexico	9.9	3.8	16.2	79.0	41.2
New York	75.0	9.5	329.7	330.6	189.7
N. Carolina	0.0	30.8	144.1	206.2	175.1
N. Dakota	10.6	3.1	7.4	29.6	7.2
Ohio	66.1	34.1	256.5	314.5	259.7
Oklahoma	50.7	20.8	50.3	127.2	77.0
Oregon	17.5	0.9	46.0	101.7	145.7
Pennsylvania	65.5	52.2	237.4	269.8	224.7
Rhode Island	5.0	1.1	25.1	20.5	9.6
S. Carolina	0.0	42.3	69.4	109.8	86.4
S. Dakota	0.0	0.0	9.0	35.2	26.2
Tennessee	33.1	34.4	98.6	150.5	141.3
Texas	193.6	250.3	281.0	617.7	530.7
Utah	8.0	8.2	25.0	76.6	31.1
Vermont	0.0	0.0	11.5	17.3	18.5
Virginia	37.8	48.8	101.5	174.2	129.1
Washington	24.6	22.5	72.9	137.5	192.4
West Virginia	14.8	12.4	23.4	49.5	231.7
Wisconsin	28.7	3.5	107.9	147.1	94.8
Wyoming	4.3	8.5	4.3	36.8	18.6
Totals	1,447.9	1,121.7	4,631.3	7,287.8	5,016.9

TABLE 5-20. VOC EMISSIONS (10^3 TONS) BY STATE AND CATEGORY (POINT AND AREA)

State	PETROLEUM MARKETING	INDUSTRIAL	INDUSTRIAL COATING	OTHER SOLVENT USE	MOBILE SOURCES	MISC.
Alabama	30.9	51.2	16.8	74.9	142.5	193.7
Arizona	15.5	0.5	0.0	51.2	107.9	50.2
Arkansas	22.2	20.1	4.3	50.6	87.1	4.3
California	155.1	154.8	27.8	537.3	809.9	426.4
Colorado	29.7	4.4	0.7	56.0	147.0	56.8
Connecticut	0.6	5.4	1.0	82.5	75.1	50.7
Delaware	6.0	13.7	5.4	12.9	21.0	9.4
Dist. of Col.	2.9	0.0	0.0	9.4	14.1	1.7
Florida	67.7	19.3	1.2	183.5	353.5	112.1
Georgia	45.5	24.1	11.3	122.4	213.1	171.6
Idaho	0.3	0.0	0.0	14.5	41.9	127.0
Illinois	91.9	92.3	50.2	280.7	290.1	152.0
Indiana	41.5	66.0	34.0	147.7	174.5	110.4
Iowa	22.0	3.5	1.9	51.5	99.0	27.7
Kansas	39.6	29.7	4.5	48.6	91.5	30.3
Kentucky	32.4	50.0	9.4	63.5	119.2	150.8
Louisiana	74.4	213.5	2.0	59.9	146.0	150.4
Maine	8.7	3.1	0.0	22.9	35.7	100.7
Maryland	27.9	3.7	5.0	76.5	123.1	21.2
Massachusetts	5.6	3.8	21.0	154.4	130.3	75.1
Michigan	57.6	35.6	43.9	231.9	265.4	15.5
Minnesota	38.2	19.3	30.8	87.0	156.7	98.7
Mississippi	34.5	25.8	5.9	49.8	88.3	67.1
Missouri	39.3	47.2	28.0	114.1	163.7	115.2
Montana	7.2	10.7	0.0	9.4	48.5	13.3
Nebraska	1.6	0.4	1.7	26.0	63.7	14.6
Nevada	5.0	0.3	0.0	13.7	41.1	16.0
New Hampshire	6.2	1.6	1.2	27.6	23.8	25.0
New Jersey	54.9	48.4	10.1	177.7	182.4	112.1
New Mexico	13.2	4.0	0.0	16.2	79.0	59.3
New York	79.0	37.3	4.7	329.7	330.6	199.6
N. Carolina	4.4	59.0	23.9	158.6	206.2	178.1
N. Dakota	10.7	3.4	0.0	7.4	29.6	9.7
Ohio	68.7	62.1	44.7	272.3	314.5	263.4
Oklahoma	60.5	29.1	1.8	52.1	127.2	87.2
Oregon	17.7	4.9	5.9	46.6	101.7	147.7
Pennsylvania	73.7	78.1	23.7	251.6	269.8	228.0
Rhode Island	5.1	1.8	2.8	27.4	20.5	9.6
S. Carolina	0.8	48.5	11.6	74.8	109.8	88.3
S. Dakota	1.1	0.1	4.0	9.0	35.2	26.5
Tennessee	34.2	92.7	18.8	107.1	150.5	148.0
Texas	278.9	551.9	14.6	289.2	617.7	564.7
Utah	16.8	10.7	0.3	25.2	76.6	35.4
Vermont	0.0	0.0	0.8	11.8	17.3	19.3
Virginia	42.6	63.4	16.5	149.8	174.2	131.5
Washington	30.8	33.0	5.4	73.4	137.5	199.3
West Virginia	16.3	50.5	25.4	35.6	49.5	233.4
Wisconsin	29.1	6.8	25.7	123.5	147.1	99.2
Wyoming	6.7	19.3	0.0	4.3	36.8	22.2
Totals	1,755.3	2,105.2	548.3	4,904.1	7,287.8	5,250.6



Pet Mktg = Petroleum Marketing
Ind = Industrial Processes
Ind Ctg = Industrial Coating
Solv = Solvent Evaporation
Misc = Miscellaneous Sources
Mobile = Mobile Sources

Figure 5-3. 1985 VOC emissions by major category (U.S. total).

- Petroleum Marketing (Pet Mktg)
  - Oil and Gas Production and Processing
  - Gasoline and Crude Oil Storage
  - Synthetic Organic Chemical (SOCMI) Storage and Transfer
  - Ship and Barge Transfer of VOC
  - Bulk Gasoline and VOC Terminals
  - Service Station Unloading (Stages I and II)
  - Additional Area Sources for Bulk Plants, and Oil/Gas Fields

- Industrial Processes (Ind)
  - Petroleum Refineries
  - Organic Chemical Manufacture (SOCMI)
  - Inorganic Chemical Manufacture
  - Plastic Products Manufacture
  - Rubber Tire Manufacture
  - Synthetic Fiber Manufacture
  - Iron and Steel Manufacture
  - Additional Area Sources for Refinery Fugitives and SOCMI

- Industrial Surface Coating (Ind Ctg)
  - Cans
  - Metal Coils
  - Metal Wood Products
  - Miscellaneous Metal Products

- Other Solvent Use (Solv)
  - Degreasing
  - Graphic Arts

- Mobile Sources (Mobile)
  - Highway Vehicles
  - Off-Highway Vehicles
  - Rail
  - Aircraft
  - Vessels

- Miscellaneous Sources (Misc)
  - Fuel Combustion
  - Solid Waste Disposal
  - Forest, Agricultural, and Other Open Burning
  - Additional Area Sources including POTWs, Cutback Asphalt, Bakeries, Pharmaceuticals, and TSDFs
  - Waste Solvent Recovery Processes
  - Stationary Internal Combustion Engines

Area sources account for 20 million tons of the 22 million tons of VOC in the area source inventory. The largest sector is mobile sources, representing 7.3 million tons (32 percent) of total U.S. VOC emissions. Two States contribute about 20 percent of the mobile source VOC emissions. On a State basis, oil-producing States have significant VOC emissions from the petroleum marketing sector. Nationally, solvent evaporation is the second largest VOC emissions source, accounting for 4.6 million tons (21 percent). Solvent evaporation sources include dry cleaning, degreasing, surface coating, printing, rubber and plastics, etc.

5.3.2.4 Area Sources

The area source inventory and major VOC sources display considerable overlap. Table 1-2 shows that the sources covered by the area source inventory contribute 90 percent of total anthropogenic VOC emissions. Major VOC categories are enumerated in 5.3.2.3. The largest area source VOC emissions categories are mobile sources (7.3 million tons) and solvent evaporation (4.6 million tons). The third largest source is residential wood burning (2.4 million tons), which contributes much of the combustion-related VOC emissions, although it represents a very small fuel consumption category. Other large area source VOC categories are hazardous waste treatment, storage, and disposal facilities (1.4 million tons) and gasoline station evaporation loss (1.0 million tons).

Area sources also contribute a large portion of total anthropogenic NO_x emissions. The largest NO_x category is mobile sources (8.8 million tons), divided between 5.1 million tons from gasoline motor vehicles and 3.4 million tons from diesel motor vehicles.

The 1985 NAPAP Emissions Inventory expanded previous EPA area source coverage to include VOC estimates for nearly 50 area source categories not part of NEDS. Emissions from area source categories are contained in Table 1-2, Appendices C and D, and Tables 5-18 through 5-20.

5.3.2.5 Emissions by Stack Height

The importance of release height to acid deposition models made collection of stack parameters a high priority for the 1985 NAPAP Emissions Inventory. Stack heights were reported in the point source inventory in feet, although these may represent the nearest 10 foot interval. For the purposes of this analysis, the stack information has been apportioned according to four height ranges:

- Less than 120 feet,
- 120 to 240 feet,
- 240 to 480 feet, and
- Greater than 480 feet.

Tables 5-21, 5-22, and 5-23 summarize SO_2, NO_x, and VOC emissions from point sources, and show two distinct patterns (Figures 5-4, 5-5, and 5-6). For SO_2 and NO_x, stacks taller than 480 feet are the predominant means of release. Fifty-six percent of SO_2 is emitted from these tall stacks, and 44 percent of NO_x. For VOCs, the situation is reversed; 88 percent of VOC emissions are from stacks under 120 feet. This distribution is related to data showing that the majority of SO_2 and NO_x is emitted from a relatively small number of utilities, whereas VOCs are distributed principally among numerous industrial processes.

Along with emissions magnitude, the number of stacks in each category should be considered. Figures 5-7, 5-8, and 5-9 display the data presented in Tables 5-21 through 5-23. For all three pollutants, there are many more stacks less than 120 feet high than in any other class. This relationship is most pronounced for VOCs, where 85 percent of the stacks are in the under-120 feet range.

It should be noted that these data apply only to point sources which designate a stack height in the inventory. Points with blank stack heights are not included. These include points, such as storage tanks, which may have plume heights, and points missing any height data. Emission totals by stack height do not match the point source sums for this reason.

TABLE 5-21. 1985 STATE SO_2 EMISSIONS (10^3 TONS) BY STACK HEIGHT

STATE	SO_2 EMISSIONS BY STACK HEIGHT (Feet)			
	<120	120-240	240-480	>480
Alabama	26.4	68.2	104.6	485.7
Arizona	91.2	8.1	25.1	550.3
Arkansas	8.4	9.5	5.0	60.4
California	55.0	12.1	13.3	0.3
Colorado	1.6	13.0	29.6	32.2
Connecticut	3.3	12.1	43.2	12.6
Delaware	4.9	45.0	53.9	10.0
Dist. of Col.	0.3	2.6	0.8	0.0
Florida	31.6	79.7	221.7	278.0
Georgia	19.1	39.7	43.6	979.5
Idaho	14.9	8.6	0.7	0.0
Illinois	75.0	206.6	278.1	801.9
Indiana	296.4	127.1	310.2	964.1
Iowa	8.8	117.5	109.4	36.4
Kansas	25.6	41.2	25.1	52.9
Kentucky	32.4	134.5	180.3	480.0
Louisiana	53.9	115.7	24.0	61.0
Maine	7.7	20.0	39.4	0.0
Maryland	13.3	11.3	42.3	186.5
Massachusetts	10.3	25.1	120.9	125.1
Michigan	29.5	43.7	210.1	235.8
Minnesota	12.5	35.1	15.7	91.4
Mississippi	6.5	23.3	128.5	0.5
Missouri	19.1	77.2	349.3	664.9
Montana	8.9	25.4	35.3	8.1
Nebraska	0.1	14.2	8.7	30.3
Nevada	1.5	2.0	4.9	25.9
New Hampshire	1.8	24.7	54.0	0.0
New Jersey	12.8	23.4	70.5	26.1
New Mexico	16.3	45.3	80.7	107.4
New York	39.4	80.7	325.6	112.4
North Carolina	35.5	72.1	146.0	180.8
North Dakota	15.7	23.0	54.7	107.1
Ohio	55.4	107.7	445.7	1,848.7
Oklahoma	14.3	14.5	23.9	65.5
Oregon	3.2	6.2	2.0	2.5
Pennsylvania	44.0	137.1	165.6	1,010.5
Rhode Island	0.8	1.9	1.3	0.0
South Carolina	26.5	67.8	120.8	4.4
South Dakota	0.3	4.0	0.0	32.2
Tennessee	48.9	55.0	167.7	673.3
Texas	225.7	308.1	518.9	193.0
Utah	11.6	10.4	4.9	25.7
Vermont	1.1	1.4	0.1	0.0
Virginia	37.3	131.3	92.7	1.6
Washington	28.3	22.1	74.8	12.1
West Virginia	37.3	107.6	104.4	800.2
Wisconsin	8.1	96.1	178.7	208.1
Wyoming	9.4	16.7	33.4	91.0
TOTAL EMISSIONS	1,531.9	2,675.6	5,090.2	11,676.1
NO. OF STACKS	13,808	6,808	2,101	834

TABLE 5-22. 1985 STATE NO$_x$ EMISSIONS (10^3 TONS) BY STACK HEIGHT

STATE	NO$_x$ EMISSIONS BY STACK HEIGHT (Feet) <120	 120-240	 240-480	 >480
Alabama	25.1	27.9	25.7	185.2
Arizona	2.4	3.0	6.8	63.3
Arkansas	11.4	8.0	3.4	48.0
California	153.9	51.3	21.0	4.4
Colorado	17.1	10.8	36.4	68.7
Connecticut	2.8	4.7	13.6	8.1
Delaware	1.3	17.3	17.6	5.8
Dist. of Col.	0.1	1.3	0.3	0.0
Florida	24.3	32.5	113.6	119.9
Georgia	20.7	23.6	23.8	223.9
Idaho	4.3	1.6	0.5	0.0
Illinois	66.1	68.9	106.3	324.0
Indiana	105.5	53.2	96.9	318.6
Iowa	9.5	25.2	43.3	21.2
Kansas	88.9	15.2	35.9	100.3
Kentucky	19.0	33.9	48.5	187.4
Louisiana	217.2	129.3	44.6	41.0
Maine	2.5	3.7	13.2	0.0
Maryland	9.3	12.3	20.8	50.9
Massachusetts	5.1	10.8	58.1	24.4
Michigan	33.3	20.9	101.2	162.0
Minnesota	15.1	17.0	10.7	111.7
Mississippi	21.4	12.4	33.0	7.6
Missouri	23.5	11.7	68.3	186.4
Montana	5.9	8.0	4.0	21.9
Nebraska	3.5	13.2	3.5	20.1
Nevada	1.5	4.3	11.8	44.8
New Hampshire	0.5	9.8	13.7	0.0
New Jersey	27.8	30.5	42.5	13.3
New Mexico	77.5	3.9	102.8	0.0
New York	19.7	24.8	99.1	34.2
North Carolina	13.1	34.6	75.5	110.2
North Dakota	7.4	2.3	24.5	81.7
Ohio	38.6	29.6	88.4	417.9
Oklahoma	68.2	30.6	20.5	35.7
Oregon	3.5	3.5	2.4	1.5
Pennsylvania	44.1	53.1	86.8	365.9
Rhode Island	0.3	1.9	0.5	0.0
South Carolina	12.7	31.0	62.7	11.8
South Dakota	0.5	4.2	0.0	12.4
Tennessee	45.1	20.6	62.1	149.7
Texas	439.8	312.5	306.0	99.4
Utah	20.7	12.4	5.3	48.2
Vermont	0.3	0.3	0.7	0.0
Virginia	23.0	66.6	48.9	0.4
Washington	21.3	10.9	40.5	0.1
West Virginia	37.8	37.3	29.1	277.5
Wisconsin	5.5	29.3	50.1	62.7
Wyoming	12.0	11.7	21.3	63.0
TOTAL	1,810.1	1,383.4	2,145.6	4,135.1
NO. OF STACKS	25,407	7,752	2,192	839

TABLE 5-23. 1985 STATE VOC EMISSIONS (10^3 TONS) BY STACK HEIGHT

STATE	VOC EMISSIONS BY STACK HEIGHT (Feet)			
	<120	120-240	240-480	>480
Alabama	43.8	21.8	2.5	6.3
Arizona	1.7	0.0	0.1	1.8
Arkansas	19.7	2.0	1.1	0.1
California	94.4	1.7	0.7	0.0
Colorado	5.0	0.6	0.1	0.3
Connecticut	3.6	0.1	0.2	0.0
Delaware	7.4	0.3	0.1	0.0
Dist. of Col.	0.5	0.2	0.0	0.0
Florida	11.4	4.2	0.9	0.5
Georgia	22.6	6.0	5.9	1.0
Idaho	1.0	0.0	0.0	0.0
Illinois	147.7	10.6	2.0	3.7
Indiana	118.2	6.2	1.1	0.9
Iowa	6.9	0.1	0.2	0.2
Kansas	31.9	0.0	0.1	0.4
Kentucky	55.1	2.3	0.2	0.6
Louisiana	115.8	10.1	1.1	1.0
Maine	2.7	1.0	2.2	0.0
Maryland	12.5	0.5	0.5	0.2
Massachusetts	34.4	2.2	0.4	0.3
Michigan	82.9	4.2	6.7	0.6
Minnesota	46.7	1.9	0.3	0.4
Mississippi	34.1	0.8	1.2	0.0
Missouri	82.4	0.6	0.3	0.6
Montana	5.6	1.8	0.0	0.2
Nebraska	3.7	0.1	0.2	0.2
Nevada	0.2	0.0	0.1	0.2
New Hampshire	3.4	0.7	0.3	0.0
New Jersey	40.9	0.7	0.2	0.2
New Mexico	20.0	1.0	0.6	0.0
New York	30.9	1.4	1.4	0.5
North Carolina	55.0	16.5	2.2	0.4
North Dakota	1.2	0.4	0.1	1.1
Ohio	74.6	18.0	0.9	1.3
Oklahoma	28.4	1.7	0.9	0.8
Oregon	10.7	1.5	0.5	0.0
Pennsylvania	65.7	6.6	2.0	1.3
Rhode Island	5.3	0.7	0.0	0.0
South Carolina	24.8	0.8	0.3	0.0
South Dakota	5.5	0.0	0.0	0.1
Tennessee	78.2	17.7	0.2	0.6
Texas	405.5	31.6	9.0	0.7
Utah	15.4	0.4	0.1	0.2
Vermont	1.1	0.0	0.8	0.0
Virginia	83.9	1.8	1.0	0.0
Washington	22.5	2.2	4.5	0.0
West Virginia	67.0	9.9	1.0	0.9
Wisconsin	45.5	3.7	0.3	0.3
Wyoming	12.3	3.8	0.1	0.6
TOTAL	2,089.4	200.5	54.8	28.8
NO. OF STACKS	45,316	5,298	1,814	803

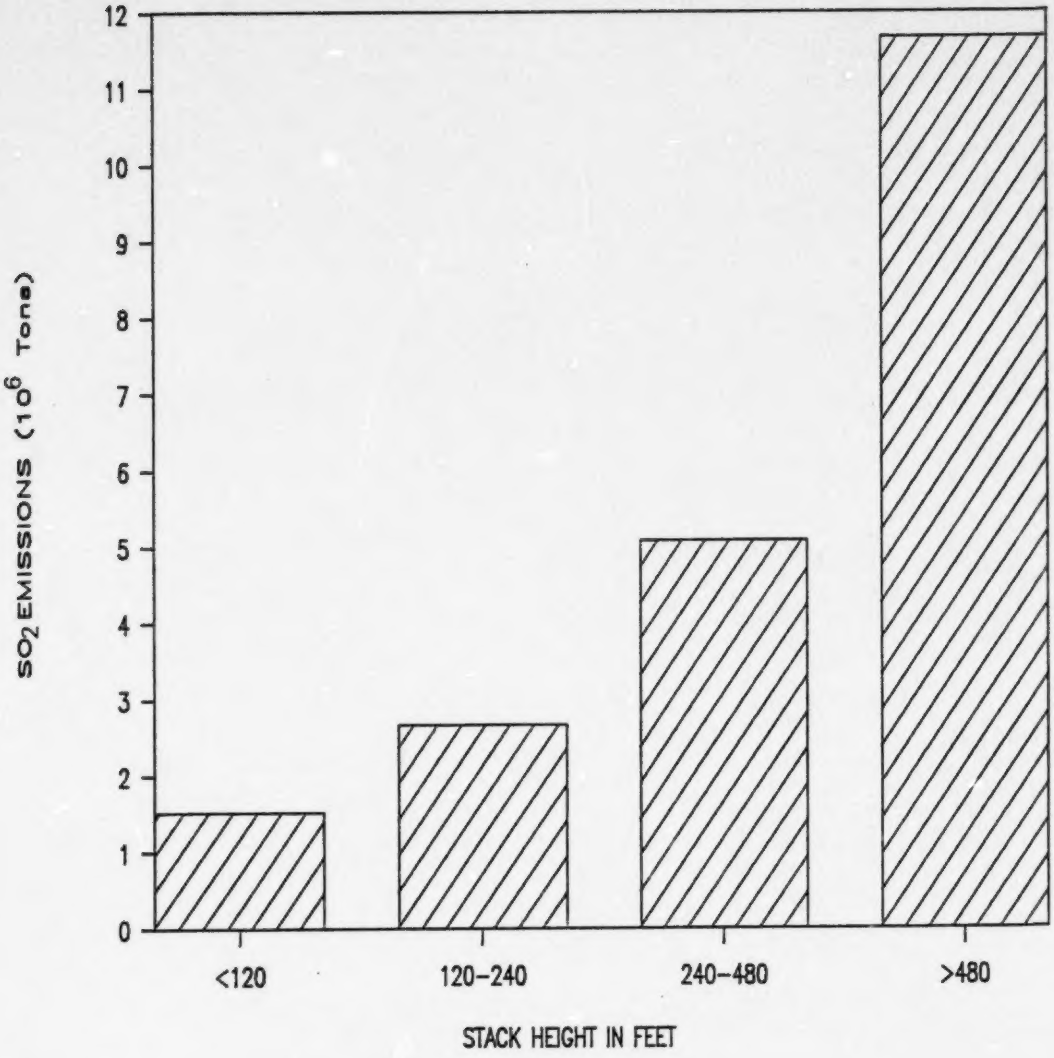


Figure 5-4. SO_2 emissions by NEDS stack height.

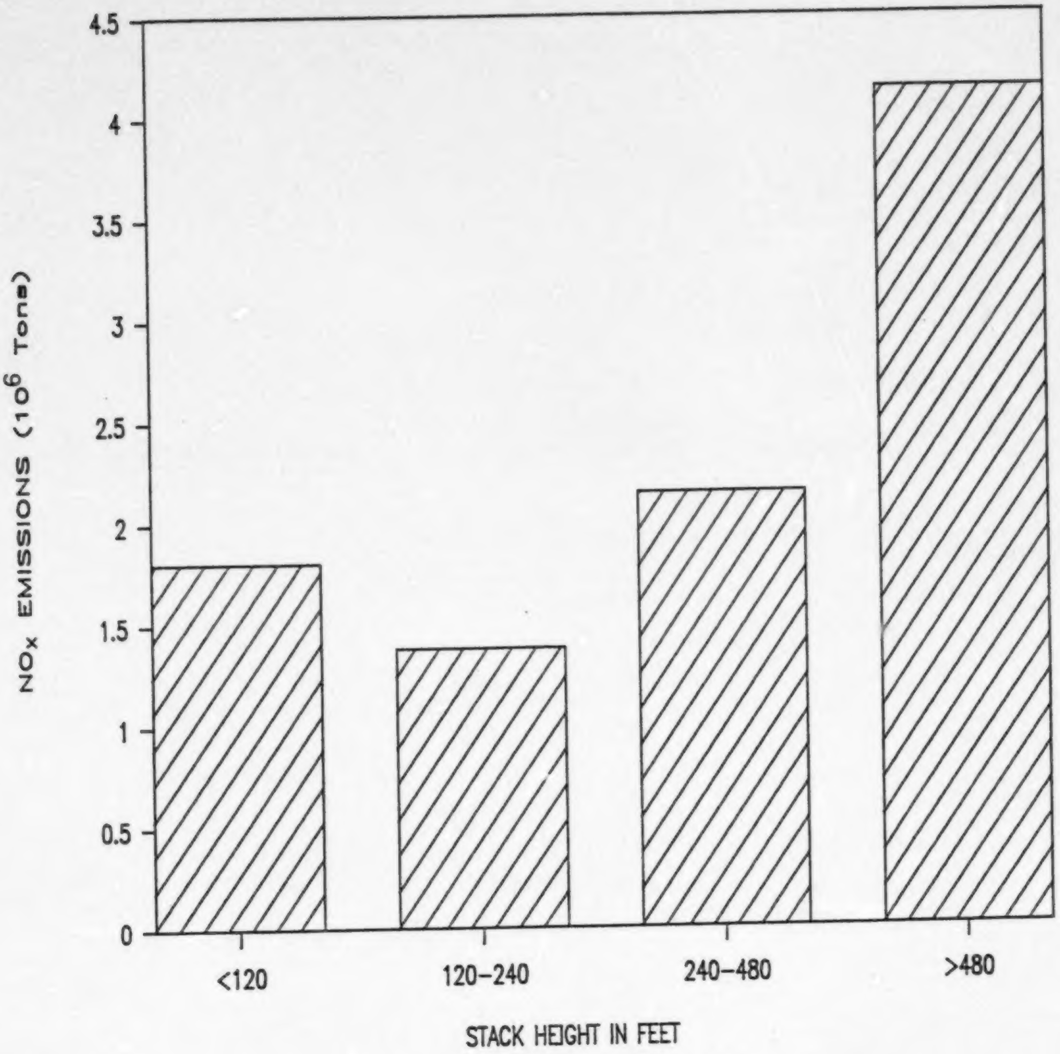


Figure 5-5. NO_x emissions by NEDS stack height.

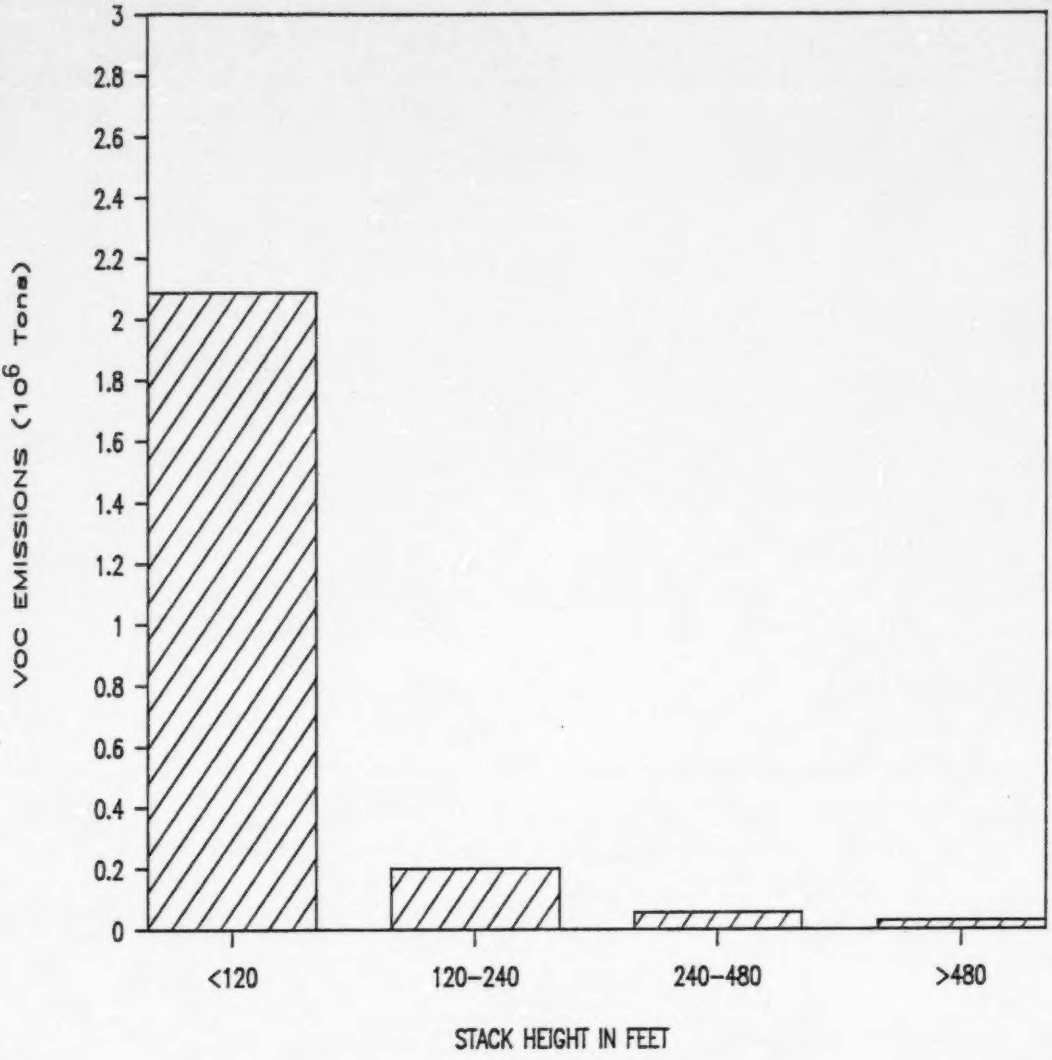


Figure 5-6. VOC emissions by NEDS stack height.

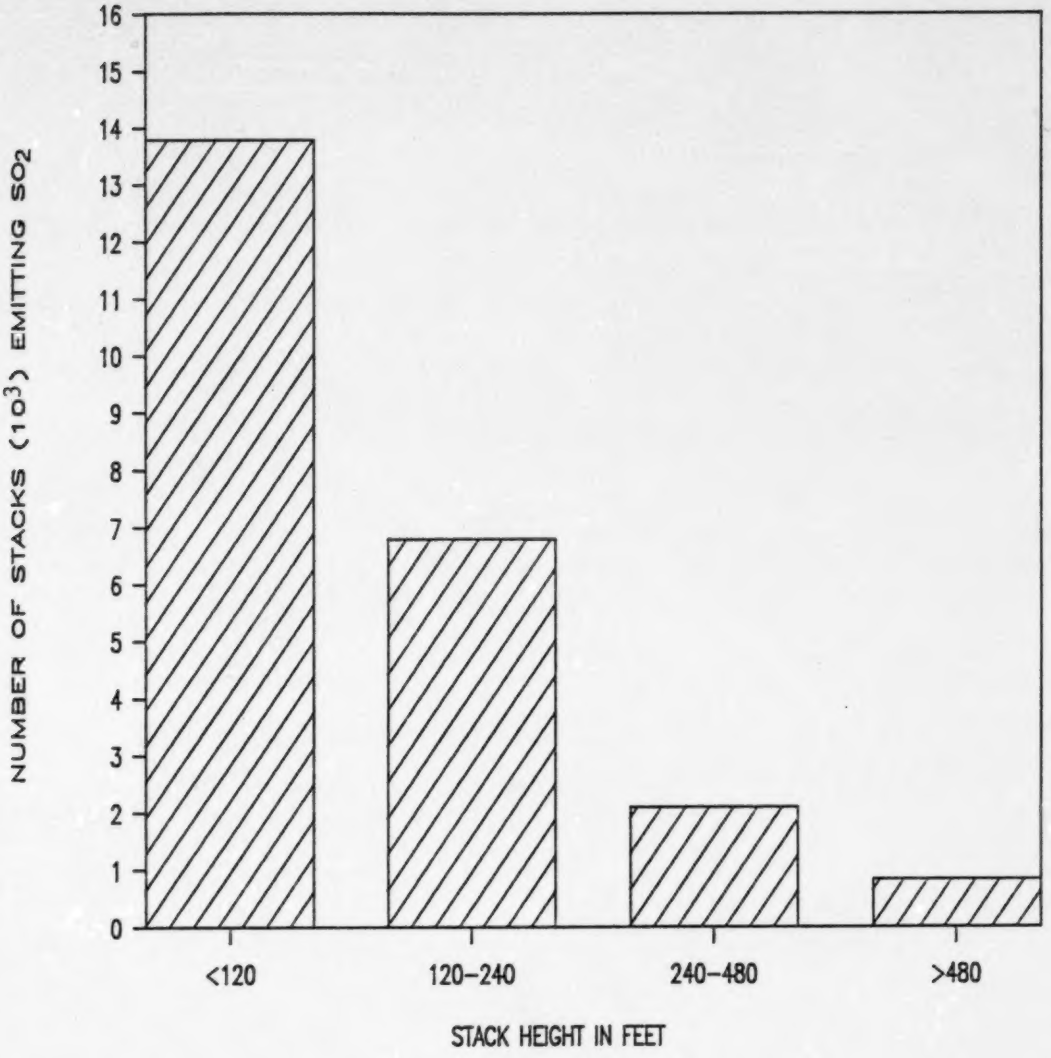


Figure 5-7. Number of stacks by height category for SO_2 emissions.

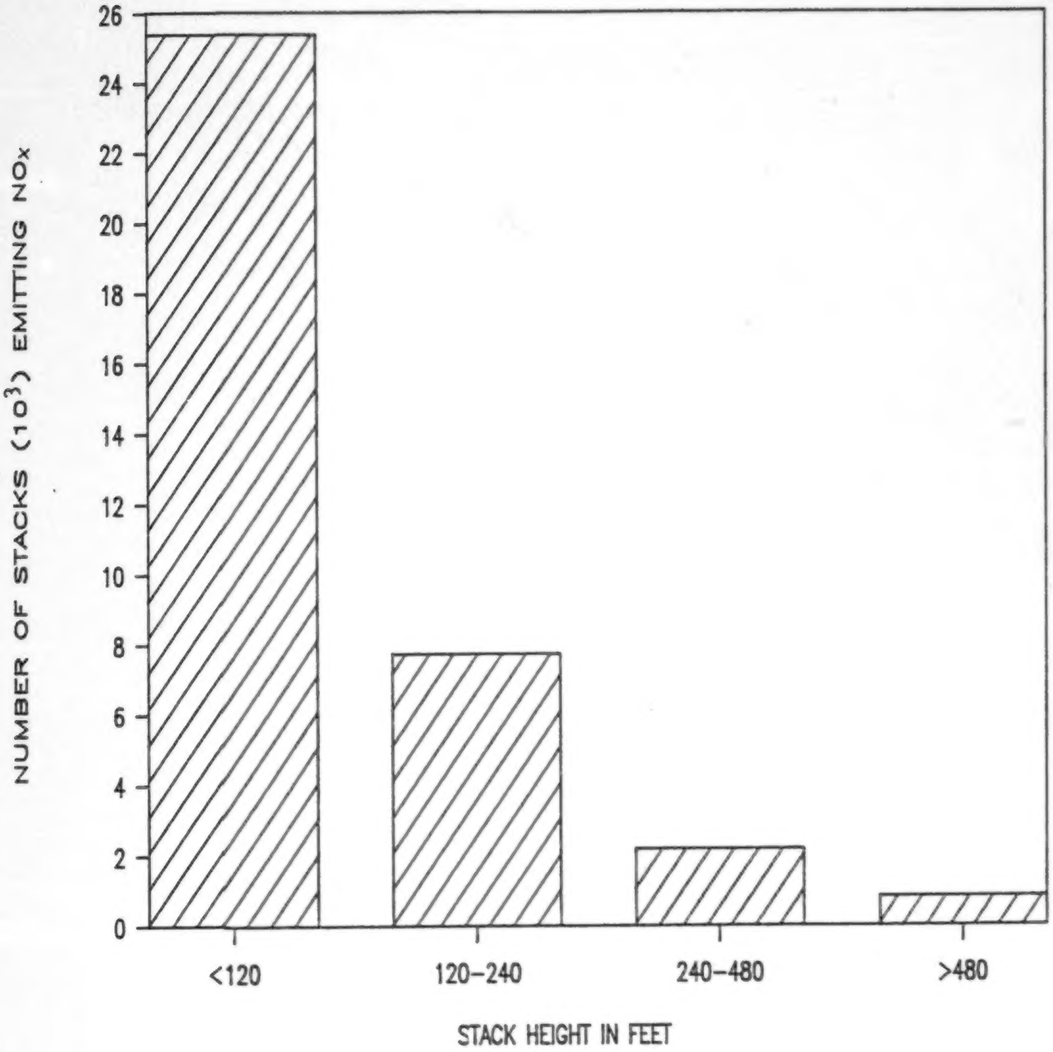


Figure 5-8. Number of stacks by height category for NO_x emissions.

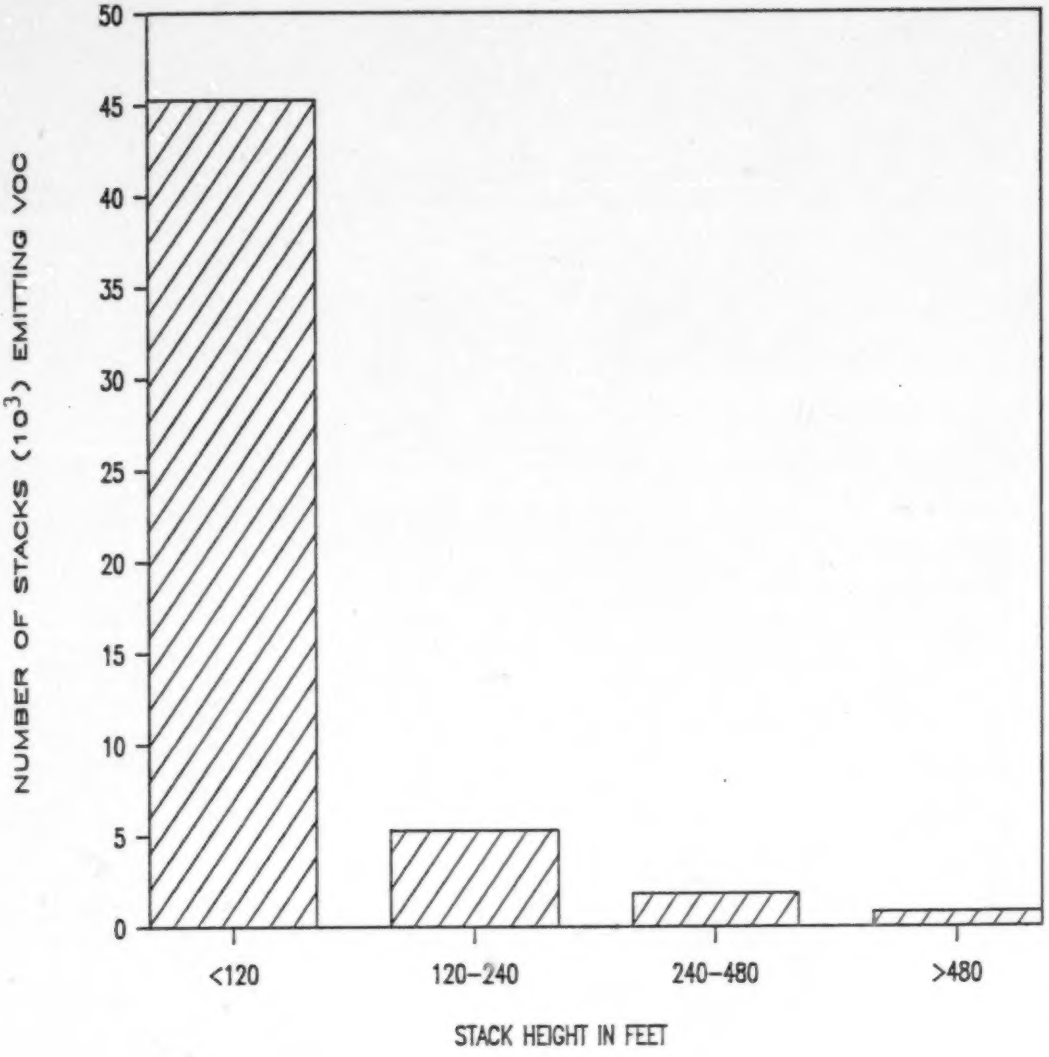


Figure 5-9. Number of stacks by height category for VOC emissions.

5.3.2.6 Noncriteria Pollutant Estimates

Table 5-24 shows emissions data for primary sulfate, ammonia, hydrogen chloride, and hydrogen fluoride. The estimates were made by EPA as described in Section 3 based on State-reported throughput data and emission factors developed for this 1985 effort. The tabulated totals include both point and area source emissions.

TABLE 5-24. ESTIMATED 1985 ACID GAS EMISSIONS (10^3 TONS)

STATE	PRIMARY SULFATES	HCl	HF	AMMONIA
Alabama	13.3	24.2	3.0	26.7
Arizona	30.3	13.2	1.6	13.6
Arkansas	6.4	11.5	2.2	41.0
California	26.6	0.0	0.2	82.1
Colorado	3.1	13.6	1.6	35.2
Connecticut	5.5	0.8	0.1	1.8
Delaware	1.9	2.5	0.3	0.9
Dist. of Col.	0.5	0.3	0.0	1.0
Florida	24.5	19.2	17.8	35.1
Georgia	14.6	28.2	3.4	41.4
Idaho	5.2	0.2	0.0	19.7
Illinois	123.5	34.8	5.5	75.6
Indiana	36.1	40.3	5.3	46.0
Iowa	3.6	13.3	1.6	130.1
Kansas	3.4	13.7	1.7	74.2
Kentucky	17.0	26.8	3.9	28.9
Louisiana	16.9	8.1	3.7	79.1
Maine	5.0	0.1	0.0	0.6
Maryland	9.7	7.7	1.2	2.6
Massachusetts	12.1	4.5	0.5	5.3
Michigan	12.6	27.3	3.3	24.3
Minnesota	7.5	11.7	1.4	57.6
Mississippi	5.8	4.2	0.5	43.5
Missouri	15.3	22.7	3.1	80.1
Montana	2.7	5.1	0.7	31.1
Nebraska	1.2	6.2	0.8	87.1
Nevada	1.6	5.4	0.7	6.2
New Hampshire	2.8	1.4	0.2	0.4
New Jersey	8.2	2.2	0.3	6.3
New Mexico	3.9	14.5	1.7	14.6
New York	24.4	8.7	1.0	10.6
North Carolina	30.1	20.0	2.6	24.6
North Dakota	9.4	0.2	0.1	21.8
Ohio	33.8	49.6	6.4	36.0
Oklahoma	8.0	12.5	1.5	60.4
Oregon	6.0	0.5	0.2	18.4
Pennsylvania	56.6	43.0	5.1	38.2
Rhode Island	1.1	0.0	0.0	0.6
South Carolina	5.4	9.2	1.1	1.5
South Dakota	2.0	0.1	0.0	44.9
Tennessee	63.3	24.3	2.9	27.0
Texas	14.6	75.4	9.1	144.0
Utah	2.5	6.0	0.7	11.4
Vermont	1.2	0.0	0.0	0.3
Virginia	16.6	9.9	1.2	20.4
Washington	10.7	0.3	1.9	22.3
West Virginia	13.4	31.6	3.9	1.0
Wisconsin	16.1	17.8	2.1	51.0
Wyoming	3.0	19.4	2.3	16.1
TOTAL	738.9	692.1	108.4	1,642.7

REFERENCES FOR SECTION 5

1. NEDS Source Classification Codes and Emission Factor Listing. Prepared by U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, National Air Data Branch, October 1985.

2. Electric Power Annual 1985, DOE/EIA-0348(85), U.S. Department of Energy, Energy Information Administration, National Energy Information Center, Washington, DC, 1986.

3. Coal Distribution January - December 1985, DOE/EIA-0125(85/4Q), U.S. Department of Energy, Energy Information Administration, Office of Oil and Gas, Washington, DC, April 1986.

4. Petroleum Marketing Monthly, DOE/EIA-0380(86/07), U.S. Department of Energy, Energy Information Administration, Office of Oil and Gas, Washington, DC, July 1986.

5. Natural Gas Annual 1985, DOE/EIA-0131(85), U.S. Department of Energy, Energy Information Administration, Office of Oil and Gas, Washington, DC, November 1986.

APPENDIX A

CORRESPONDENCE FROM EPA ADMINISTRATOR AND ASSISTANT ADMINISTRATOR TO EPA AND STATE PARTICIPANTS IN THE 1985 INVENTORY

EPA Administrator Letter on the 1985 Emission Inventory

Dear "State Environmental Director":

The air quality management effort in the United States is facing major new challenges to provide appropriate and timely responses to both existing and new environmental problems. One of the new challenges that demands the efforts of all of us is reducing the critical uncertainties associated with the acid deposition issue. These uncertainties involve not only the science of acid deposition but also the potential questions of how a possible control program might be implemented.

Consequently, I am asking the States to participate in an important national effort to reduce one of those uncertainties through the development of an accurate and complete baseline emissions inventory for calendar year 1985. Normally, States update their emissions inventories annually. For 1985, however, the National Acid Precipitation Assessment Program (NAPAP) will be looking for the best possible emissions inventory and needs a coordinated effort on the part of all States to ensure a nationally consistent one. Such a product will not only be useful for national research and policy analysis but also helpful to States for their research and policy assessments, as well as environmental program planning and management.

The Environmental Protection Agency (EPA) is committed to work with the States to assist NAPAP in developing this important emissions inventory. EPA's primary interface with the States will be through the State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officials (STAPPA/ALAPCO) Acid Rain Committee chaired by Mr. James Hambright (head of the Pennsylvania air program) and Mr. William Becker (Executive Secretary of STAPPA/ALAPCO). This coordination effort has already begun in order to assure that this inventory meets the needs of both NAPAP and the States.

I am placing a high priority on this effort within EPA to ensure that necessary Federal tasks are carried out in a timely manner. I strongly believe that the participation of each State is the key to the success of this inventory effort; therefore, I urge each State to give a high priority to its involvement in this national program. Such priority is needed by all States as well as EPA to assure the timely development of a nationally consistent, high quality emissions inventory.

To complete this national effort, we will be asking all States to meet the traditional inventory submittal date, which in this case will be July 1, 1986.

I realize that your ongoing inventory-related activities are probably already competing for scarce resources and that emission inventory development and maintenance capabilities vary across States. At the same time I know you recognize the far reaching benefits of a sound emissions inventory. Therefore, EPA, in conjunction with the STAPPA/ALAPCO Committee will be identifying the most critical needs and seeking ways to allow all States to produce consistent and high quality emission inventories. In the near future, your State air program director will be contacted about your inventory capabilities as well as suggestions you may have on how this and future inventory efforts can be carried out more effectively.

I am sure you will agree that each State should be playing an important role in the development of the 1985 national emission inventory. I look forward to a cooperative and productive effort among State and Federal agencies in this endeavor.

Sincerely yours,

Lee M. Thomas

cc: State Air Program Directors
Regional Administrator, Regions I-X

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
AIR AND RADIATION

Dear State Air Program Director:

The purpose of this letter is to review our plans for completing the 1985 Emissions Inventory. It has been about a year since Lee Thomas wrote each State requesting help to make the 1985 inventory the most accurate and comprehensive inventory ever conducted. He indicated that the 1985 inventory must become a high priority research effort for both EPA and States to help the National Acid Precipitation Assessment Program (NAPAP) reduce critical uncertainties surrounding the emission of acid rain precursors.

During the past year, we have developed an inventory team composed of participants from both EPA and State staffs to meet these objectives. Initially, we worked with the Acid Rain Committee of the State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (chaired by Mr. James Hambright) to survey each State and identify critical inventory resource constraints.

Based on State responses to this survey, EPA's Air and Energy Engineering Research Laboratory (AEERL) and Office of Air Quality Planning and Standards (OAQPS) distributed $1.1 million for State inventory assistance. Additionally, AEERL and OAQPS developed and presented inventory training workshops for State personnel and their contractors to help standardize data collection and recording procedures nationwide. These groups also provided technical inventory assistance and developed computer software to quality assure inventory data.

Building on these resources, State inventory teams are collecting 1985 inventory data for submittal to the National Emissions Data System (NEDS). Currently, most States have acquired these data and are submitting them to our Regional Offices.

On behalf of the EPA members on the 1985 inventory team, I want to thank you for your active participation in the 1985 inventory. Your diligence in obtaining, confirming, and recording inventory data has been crucial to the success of the project.

I also want to assure you that the high priority status that EPA has accorded this project will not end when your data are submitted to the Regional Offices. Our inventory staff in AEERL and OAQPS will quality assure your inventory data promptly and will send a written report to your emission inventory manager about any questions that arise.

The purpose of this quality assurance report is to help us agree that the point source emission estimates for your State have been accurately entered into the NEDS and NAPAP data bases and are free of any problems or errors. If the report does identify problems with inventory data, I would appreciate your help in correcting them and forwarding the corrected data to us.

These quality assurance reports are a key part of our research program to develop a 1985 emissions inventory for NAPAP that is based on both point and area source emission estimates for the 48 contiguous states in the United States and for each Province in Canada. I have enclosed for your information a document which summarizes our quality assurance program for the NAPAP inventory.

I estimate that a draft report to NAPAP of the 1985 United States point source emissions inventory will be completed by June 1987. A corresponding report for area source emissions estimates, which is based in part on the point source data you submit, will be completed by August 1987. Draft copies of both reports will be sent to you for review before they are issued as final reports and transmitted to NAPAP.

I am sure that you will agree that our plans for completing the 1985 inventory will result in an inventory that we can both have confidence in. I look forward to continued cooperation among State and EPA inventory staffs in this endeavor.

Sincerely,

J Craig Potter

J. Craig Potter
Assistant Administrator
for Air and Radiation

Enclosure

APPENDIX B

NE061 EDIT CHECKING MESSAGES

Table 7.1.1-a NEDS EDIT ERROR REJECTION MESSAGES

The following errors will result in the rejection of the transaction.

1. _____IS AN INVALID STATE ID

   Explanation: Valid State ID's are 01-55.

2. _____IS AN INVALID COUNTY ID

   Explanation: The county shown is not a valid entry in the AERO-CTYCNTY File.

3. _____IS AN INVALID AQCR

   Explanation: Valid AQCR's are 001-247.

4. _____PLANT ID CONTAINS BLANKS

   Explanation: Plant ID may not contain blanks.

5. _____POINT CANNOT CONTAIN BLANKS

   Explanation: Point ID may not contain blanks.

6. _____ERROR IN SCC

   Explanation: The SCC must be completely filled in to be a valid entry in the NEDS-EM-FACT file. Valid SCC Codes are in the Source Classification Code Table in AEROS Volume V, Section 3.7. A computer printout listing valid SCC's in numerical order may also be created by executing program NE216.

7. _____IN COLUMN 78

   Explanation: The only allowable entries in this column are: A(add), C(change), and D(delete).

8. _____IN COLUMN 79 NO OTHER EDITS MADE

   Explanation: The only allowable entries in this column are: A(area source) and P(point source).

9. _____IN COLUMN 80'

   Explanation: The only allowable entries in this column are 1-7.

10. _____INVALID ACTION/CARD COMBINATION

    Explanation: For Area Source records, a "D" action is valid only for card number 1. For point source records, a "D" action is valid only for card numbers 1, 2, and 6.

11. _____BLANK ESTABLISHMENT NAME INVALID

    Explanation: The establishment name and address must be entered or cannot be changed to blank.

12. _____IS AN INVALID CONTROL CODE

    Explanation: The Control Equipment Code shown is not in the control code table. Valid entries are in Volume V of the AEROS Manual. Blanks are only permitted when the corresponding Percent Efficiency is also blank.

13. ______CONTROL CODE/% EFFICIENCY INVALID

Explanation: For the pollutant shown, a control equipment code is shown and control efficiency is blank or vice versa. Either control device field should be changed to blank or control efficiency should be entered.

14. ______EMISSION EST. > 800,000 TONS

Explanation: The pollutant shown has estimated emissions greater than the allowed maximum (800,000 tons).

15. ______BLANK EMISSION ESTIMATE INVALID

Explanation: If the estimation method for a pollutant is 1, 2, 4, 5, an estimated emission must be shown for that pollutant.

16. ______ESTIMATION METHOD INVALID

Explanation: The valid estimation method codes are 0-7 and blank. However, for add transactions, blanks are allowed only if the corresponding emission estimate is also blank.

17. ______IS AN INVALID CONFIDENTIALITY CD

Explanation: Any code except 1 or 2 is invalid.

*18. NON-NUMERIC IN_____

Explanation: If an entry is made in the field shown, that entry must be all numeric.

* A list of all fields for which this message applies is given in Table 7.1.1-b of this section.

Table 7.1.1-a NEDS EDIT ERROR MESSAGES

*A total of 139 fields in the Area Source and Point Source cards may appear in error message number 18. The field names are abbreviated in the message due to limited print line space. The following pages are a cross-reference showing the abbreviated field name, the number of the card containing the field, and the field name.

Table 7.1.1-b FIELDS REQUIRING ALL NUMERICS (or all blanks)

Error Message Abbreviation	Card	Field Name
1. City Code	1	City Code
2. UTM Zone	1	Universal Transverse Mercator Zone
3. SIC CODE	2	Standard Industrial Classification Code
4. IPP PROCESS CODE	2	IPP Process Code
5. UTM Coord. Horz.	2	UTM Horizontal Coordinate
6. UTM Coord. Vert.	2	UTM Vertical Coordinate
7. Stack Height	2	Stack Height (Ft.)
8. Stack Diameter	2	Stack Diameter (Ft.)
9. Stack Temp.	2	Stack Temperature (Degrees F.)
10. Flow Rate	2	Stack Flow Rate (Cubic Ft./minute)
11. Plume Height	2	Plume Height (Ft.)-if no stack
12. Boiler Des. Cap.	3	Boiler Design Capacity (1,000,000 BTU/hr)
13. Pri. Part. Contrl	3	Control Equipment Code - Primary Particulate
14. Sec. Part.	3	Control Equipment Code - Secondary Particulate
15. Pri SO2 Control	3	Control Equipment Code - Primary SO_2
16. Sec. SO2 Control	3	Control Equipment Code - Secondary SO_2
17. Pri NOX Control	3	Control Equipment Code - Primary NO_x

Table 7.1.1-b Fields Requiring All Numerics (or all blanks)

Error Message Abbreviation	Card	Field Name
18. Sec NOX Control	3	Control Equipment Code - Secondary NO_x
19. Pri. Voc Control	3	Control Equipment Code - Primary VOC
20. Sec. VOC Control	3	Control Equipment Code - Secondary VOC
21. Pri. CO Control	3	Control Equipment Code - Primary CO
22. Sec. CO Control	3	Control equipment Code - Secondary CO
23. Part. Control Eff.	3	Estimated Control Efficiency %-Particulate
24. SO2 Control Eff.	3	Estimated Control Efficiency %-SO_2
25. NOX Control Eff.	3	Estimated Control Efficiency %-NO_x
26. VOC Control Eff.	3	Estimated Control Efficiency %-VOC
27. CO Control Eff.	3	Estimated Control Efficiency %-CO
28. DEC-FEB T.P. PCT.	4	% Annual Throughput, December-February
29. MAR-MAY T.P. PCT.	4	% Annual Throughput, March-May
30. JUN-AUG T.P. PCT.	4	% Annual Throughput, June-August
31. SEP-NOV T.P. PCT.	4	% Annual Throughput, September-November

Table 7.1.1-b Fields Requiring All Numerics (or all blanks)

Error Message Abbreviation	Card	Field Name
32. Normal Op. Hr/Day	4	Normal operating hours per day
33. Normal Op. Day/WK	4	Normal operating days per week
34. Normal Op. Wk/Yr	4	Normal operating weeks per year
35. Emis. Est. Part.	4	Estimated tons of particulate emissions for a year
36. Emis. Est. SO2	4	Estimated tons of SO_2 emissions for a year
37. Emis. Est. NOX	4	Estimated tons of NO_x emissions for a year
38. Emis. Est. VOC	4	Estimated tons of VOC emissions for a year
39. Emis. Est. CO	4	Estimated tons of CO emissions for a year
40. Est. Meth. Part.	4	Estimation Method Code used for particulate
41. Est. Meth. SO2	4	Estimation Method Code used for SO_2
42. Est. Meth. NOX	4	Estimation Method Code used for NO_x
43. Est. Meth. VOC	4	Estimation Method Code used for VOC
44. Est. Meth. CO	4	Estimation Method Code used for CO
45. PCT. SPACE HEAT	4	Percentage of Space Heated

Table 7.1.1-b Fields Requiring All Numerics (or all blanks)

Error Message Abbreviation	Card	Field Name
46. Emis. ALLOW PART	5	Allowable Emission tons per year of particulate
47. Emis. ALLOW SO2	5	Allowable Emission tons per year of SO_2
48. Emis. ALLOW NOX	5	Allowable Emission tons per year of NO_x
49. Emis. ALLOW VOC	5	Allowable Emission tons per year of VOC
50. Emis. ALLOW CO	5	Allowable Emission tons per year of CO
51. Compliance Status	5	Compliance Status Code
52. Comp. Sched. Year	5	Compliance Schedule Year
53. Comp. Sched. Mo.	5	Compliance Schedule Month
54. Comp. Stat. Up. YR	5	Compliance Status Update Year
55. Comp. Stat. Up. MO	5	Compliance Status Update Month
56. Comp. Stat. Up. DA	5	Compliance Status Update Day
57. ECAP	5	Emergency Control Action Program Status Code
58. Operating Rate	6	Annual Fuel, Process, Solid Waste Operating Rate

Table 7.1.1-b Fields Requiring All Numerics (or all blanks)

Error Message Abbreviation	Card	Field Name
59. Max Design Rate	6	Hourly Maximum Design Rate
60. Percent Sulfur	6	Fuel Percent Sulfur Content
61. Percent Ash	6	Fuel Percent Ash Content
62. Heat Content	6	Fuel Heat Content (1,000,000 BTU/SCC)

***The remainder of this list is the fields found on area source cards

63. SIP EST. PART	1	SIP Emission Estimate (10^2 tons/yr)-Particulate
64. SIP EST. SO2	1	SIP Emission Estimate (10^2 tons/yr)-SO_2
65. SIP EST. NOX	1	SIP Emission Estimate (10^2 tons/yr)-NO_x
66. SIP EST. HC	1	SIP Emission Estimate (10^2 tons/yr)-HC
67. SIP EST. CO	1	SIP Emission Estimate (10^2 tons/yr)-CO
68. Anth. Sulfur Pct.	1	Sulfur Content Percent-Anthracite Coal
69. Bitum. Sulfur Pct.	1	Sulfur Content Percent-Bituminous Coal

Table 7.1.1-b Fields Requiring All Numerics (or all blanks)

Error Message Abbreviation	Card	Field Name
70. D. OIL Sulfur Pct.	1	Sulfur Content Percent-Distillate Oil
71. R. OIL Sulfur Pct.	1	Sulfur Content Percent-Residual Oil
72. Anth. Ash Pct.	1	Ash Content Percent-Anthracite Coal
73. Bitum. Ash Pct.	1	Ash Content Percent-Bituminous Coal
74. R. FUEL-Anthracite	1	Residential Fuel-Anthracite Coal (10^1 tons)
75. R. FUEL-Bituminous	1	Residential Fuel-Bituminous Coal (10^1 tons)
76. R. FUEL-D OIL	1	Residential Fuel-Distillate Oil (10^4 gal.)
77. R. FUEL-R. OIL	1	Residential Fuel-Residual Oil (10^4 gal.)
78. R. FUEL-NAT. GAS	1	Residential Fuel-Natural Gas (10^7 Ft^3)
79. R. FUEL-WOOD	1	Residential Fuel-Wood (10^2 tons)
80. CI FUEL-Anthracite	2	Commercial and Institutional Fuel-Anthracite Coal (10^1 tons)

Table 7.1.1-b Fields Requiring All Numerics (or all blanks)

Error Message Abbreviation	Card	Field Name
81. CI FUEL-Bituminous	2	Commercial and Institutional Fuel-Bituminous Coal (10^1 tons)
82. CI FUEL-D. Oil	2	Commercial and Institutional Fuel-Distillate Oil (10^4 gal.)
83. CI FUEL-R. Oil	2	Commercial and Institutional Fuel-Residual Oil (10^4 gal.)
84. CI FUEL-Nat. Gas	2	Commercial and Institutional Fuel-Natural Gas (10^7 Ft^3)
85. CI FUEL-Wood	2	Commercial and Institutional Fuel-Wood (10^2 tons)
86. I. FUEL-Anthracite	2	Industrial Fuel-Anthracite Coal (10^1 tons)
87. I. FUEL-Bituminous	2	Industrial Fuel-Bituminous Coal (10^1 tons)
88. I. FUEL-Coke	2	Industrial Fuel-Coke (10^1 tons)
89. I. FUEL-D. Oil	2	Industrial Fuel-Distillate Oil (10^4 gal.)
90. I. FUEL-R. Oil	2	Industrial Fuel-Residual Oil (10^4 gal.)

Table 7.1.1-b Fields Requiring All Numerics (or all blanks)

Error Message Abbreviation	Card	Field Name
91. I. FUEL-Nat. Gas	2	Industrial Fuel-Natural Gas ($10^7 Ft^3$)
92. I. FUEL-Wood	2	Industrial Fuel-Wood (10^2 tons)
93. I. FUEL-Pro. Gas	2	Industrial Fuel-Processed Gas (10^7 Ft^3)
94. OSI-Residential	3	On Site Burning-Residential (10^1 tons)
95. OSI-Industrial	3	On Site Burning-Industrial (10^2 tons)
96. OSI-COMM/INST	3	On Site Burning-Commercial and Institutional (10^2 tons)
97. OB-Residential	3	Open Burning-Residential (10^2 tons)
98. OB-Industrial	3	Open Burning-Industrial (10^2 tons)
99. OB-COMM/INST	3	Open Burning-Commercial and Institutional (10^2 tons)
100. Gasoline-LVH	3	Gasoline-Light Vehicles (10^3 gals.)
101. Gasoline-HVH	3	Gasoline-Heavy Vehicles (10^3 gals.)

Table 7.1.1-b Fields Requiring All Numerics (or all blanks)

Error Message Abbreviation	Card	Field Name
102. Gasoline-OFF H.W.	3	Gasoline-Off Highway (10^3 gals.)
103. DIESEL-HVH	3	DIESEL-Heavy Vehicles (10^3 gals.)
104. DIESEL-OFF H.W.	3	DIESEL-Off Highway (10^4 gals.)
105. DIESEL-Rail	3	DIESEL-Rail Locomotive (10^4 gals.)
106. Population Code	3	Population Code
107. Aircraft-Mil.	4	Aircraft-Military (LTO Cycles 10^1)
108. Aircraft-Civil	4	Aircraft-Civil (LTO Cycles 10^1)
109. Aircraft-Comm.	4	Aircraft-Commercial (LTO Cycles 10^1)
110. Vessels-Coal	4	Vessels-Coal (10^1 tons)
111. Vessels-Diesel	4	Vessels-Diesel Oil (10^4 gal.)
112. Vessels-R. Oil	4	Vessels-Residual Oil (10^4 gal.)
113. Vessels-Gas	4	Vessels-Gasoline (10^3 gal.)
114. Evaporate-Solv	4	Evaporation-Solvent Purchases (tons/year)

Table 7.1.1-b Fields Requiring All Numerics (or all blanks)

Error Message Abbreviation	Card	Field Name
115. Evaporate-Gas	4	Evaporation-Gasoline Marketed (10^5 gal.)
116. MVM-L. ACC.	4	Measured Vehicle Miles-Limited Access Roads (10^4 miles)
117. MVM-Rural	4	Measured Vehicle Miles-Rural Roads (10^4 miles)
118. MVM-Suburb	4	Measured Vehicle Miles-Suburban Roads (10^4 miles)
119. MVM-Urban	4	Measured Vehicle Miles-Urban Roads (10^4 miles)
120. Dirt Roads Travel	5	Dirt Roads Traveled (10^3 Vehicle Miles)
121. Dirt Air Strips	5	Dirt Air Strips (LTO Cycles)
122. Construction Acres	5	Construction Acres (10^3 Acres)
123. Misc. Wind Erosion	5	Miscellaneous Wind Erosion (10^3 Acres)
124. Land Tilling	5	Land Tilling (10^3 Acres)
125. Forest Fire Acres	5	Forest Wild Fires-Acres burned
126. Forest Fire Tons	5	Forest Wild Fires-Tons/Acres burned

Table 7.1.1-b Fields Requiring All Numerics (or all blanks)

Error Message Abbreviation		Card	Field Name
127.	Manage Burn Acres	5	Managed Burning (Prescribed)-Acres burned
128.	Manage Burn Tons	5	Managed Burning (Prescribed)-Tons/Acres burned
129.	Agri. Burn Tons	5	Agricultural Field Burning-Acres burned
130.	Agri. Burn Tons	5	Agricultural Field Burning-Tons/Acres burned
131.	Frost. Cont. Orch.	5	Frost Control-Orchard Heaters Operation (10^2)
132.	Frost. Cont. Days	5	Frost Control-Days/Fired, Days/Year
133.	Structure Fires	5	Structure Fires per year
134.	Source Code	7	Source Code
135.	Source Em. Est.-P	7	Source Emission Estimate (tons/yr)-Particulate
136.	Source Em. Est.-S	7	Source Emission Estimate (tons/yr)-SO_2
137.	Source Em. Est.-N	7	Source Emission-NO_x
138.	Source Em. Est.-V	7	Source Emission Estimate (tons/yr)-VOC
139.	Source E . Est.-C	7	Source Emission Estimate (tons/yr)-CO

Table 7.1.1-c NEDS EDIT WARNING MESSAGES

The following messages indicate likely data errors, but do not cause transactions to be rejected.

40. WARNING-CITY CODE NOT ON FILE
Explanation: The city shown is not blank or a valid entry in the AERO-CTYCNTY file.

41. WARNING-UTM ZONE NUMBER IS BLANK
Explanation: The UTM zone number should always be entered.

42. WARNING-UTM ZONE NOT IN RANGE
Explanation: The UTM zone should be coded within the specified range for the state entered. An invalid state code will suppress this check. Table 7.1.1-d of this section contains valid UTM Zone ranges.

43. ______WARNING-YEAR > CURRENT YEAR
Explanation: The year-of-record must be less than or equal to current year.

44. _____WARNING-INVALID OWNERSHIP CODE
Explanation: Valid ownership codes are as follows:

P-Private
L-Local Government
S-State Government
F-Federal Government
U-Utility (Electric Power Plants, etc.)
Blank-No Entry

All invalid codes are changed to blanks.

45. WARNING-SIC CODE NOT ON FILE
Explanation: The Standard Industrial Classification must be blank or a valid entry on the NEDS-SICNMS file.

46. WARNING-BLANK UTM COORDINATES
Explanation: The UTM coordinates should always be entered.

47. WARNING-UTM (HORZ) NOT IN RANGE
Explanation: The UTM horizontal coordinate is numeric but not within the range specified for the state code entered. Table 7.1.1-d of this section contains valid horizontal coordinate ranges.

48. WARNING-UTM (VERT) NOT IN RANGE
Explanation: The UTM vertical coordinate is numeric but not within the range specified for the state code entered. Reference Table 7.1.1-d of this section for valid vertical coordinate ranges.

49. WARNING-STACK HEIGHT >600
    Explanation: Stack Height is numeric but is not a value less than 600.

50. WARNING-STACK DIA > .2 X STACK HT
    Explanation: Stack Diameter must be less than 20% of the Stack Height if both are entered.

51. WARNING-STACK TEMP >2000°
    Explanation: Stack Temperature must not be greater than 2000°F.

52. WARNING-PLUME HT >200 FT.
    Explanation: Plume Height must be less than 200.

53. _____WARNING-POINT NOT IN RANGE ______-______
    Explanation: Entries in cols. 56-59 indicate this point shares a common discharge stack but the point ID is not within the range specified in cols. 56-59.

54. WARNING-BLANK COMMON STACK POINT
    Explanation: If an entry is made in cols. 56-59 (points with common stack), both the low point number (56-57) and the high point number (58-59) must be entered.

55. WARNING-COMMON PT 1 > PT 2
Explanation: Cols. 56-57 and 58-59 represent a range of point numbers sharing a common discharge stack. Cols. 58-59 must be the larger point number.

56. WARNING-INVALID POLL. FOR EQP COD
Explanation: Each control equipment code may be valid for specific pollutants. The equipment code entered is not valid for the pollutant for which it was entered. Table 7.1.1-e of this section contains the pollutants valid for each equipment code.

57. WARNING-POLL. % NOT IN RANGE
Explanation: A Range of values is specified for each control code for each pollutant. The percent efficiency is not within the range. Table 7.1.1-e of this section contains the percent efficiency ranges.

58. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Explanation: As a result of program modifications, this message has been deleted. This message previously read "WARNING-EQP CODES MUST BE ≠ OR BLANK".

59. WARNING-PERCENT THRUPUT NOT = 100
Explanation: The sum of the percent thruput fields must total 100 unless one of the fields contains 99 and the others are blank or 0 for an add transaction.

60. WARNING-HR/DAY > 24
Explanation: The operating hours/day cannot exceed 24.

61. WARNING-DAY/WK > 7
Explanation: The operating days/week must not exceed 7.

62. WARNING-WK/YR > 52
Explanation: The operating weeks/year must not exceed 52.

63. WARNING-PART EST. > 25,000
Explanation: Estimated emissions exceed 25,000 and may be incorrect, however any number between 25,000 and 800,000 will be accepted.

64. WARNING-SO_2 EST. > 25,000
Explanation: Estimated emissions exceed 25,000 and may be incorrect, however any number between 25,000 and 800,00 will be accepted.

65. WARNING-NOX EST. > 25,000
Explanation: Estimated emissions exceed 25,000 and may be incorrect, however any number between 25,000 and 800,000 will be accepted.

66. WARNING-VOC EST. > 25,000
Explanation: Estimated emissions exceed 25,000 and may be incorrect, however any number between 25,000 and 800,000 will be accepted.

67. WARNING-CO EST. > 25,000

Explanation: Estimated emissions exceed 25,000 and may be incorrect, however any number between 25,000 and 800,000 will be accepted.

68. WARNING-PART ALLOW EMIS INVALID

Explanation: Allowable emissions exceed 25,000 and may be incorrect, however a valid entry is 9,999,999. Any number between 25,000 and 9,999,999 may be invalid but will be accepted.

69. WARNING-SO_2 ALLOW EMIS INVALID

Explanation: Allowable emissions exceed 25,000 and may be incorrect, however a valid entry is 9,999,999. Any number between 25,000 and 9,999,999 may be invalid but will be accepted.

70. WARNING-NOX ALLOW EMIS INVALID

Explanation: Allowable emissions exceed 25,000 and may be incorrect, however a valid entry is 9,999,999. Any number between 25,000 and 9,999,999 may be invalid but will be accepted.

71. WARNING-VOC ALLOW EMIS INVALID

Explanation: Allowable emissions exceed 25,000 and may be incorrect, however a valid entry is 9,999,999. Any number between 25,000 and 9,999,999 may be invalid but will be accepted.

72. WARNING - CO ALLOW EMIS INVALID
Explanation: Allowable emissions exceed 25,000 and may be incorrect, however a valid entry is 9,999,999. Any number between 25,000 and 9,999,999 may be invalid but will be accepted.

73. WARNING - COMPLIANCE STATUS INVALID
Explanation: Compliance Status must be 1,2,3, or 4 (blank is also valid for change transactions).

74. WARNING - COMPLIANCE YEAR INVALID
Explanation: Combined with Compliance schedule month, compliance schedule year must represent a date within the next 5 years.

75. WARNING - COMPLIANCE UPDATE INVALID
Explanation: The date contained in Compliance Update must not exceed the current date.

76. WARNING - ECAP INVALID
Explanation: ECAP must be 0,1,2, or blank.

77. WARNING - OPERATE/DES RATE INVALID
Explanation: Operating Rate must not exceed (8760 x 1.1) times the Design Rate.

78. WARNING - ASH CONT. NOT IN RANGE
Explanation: The Fuel Ash Content must be blank, or within the range specified for the SCC entered. Table 7.1.1.f of this section contains the valid Ash Content ranges.

79. WARNING - SULF CONT. NOT IN RANGE
Explanation: The Fuel Sulfur Content must be blank or within the range specified for the SCC entered. Table 7.1.1.f of this section contains the valid sulfur content ranges.

80. WARNING - HEAT CONT. NOT IN RANGE
Explanation: The Fuel Heat Content must be blank or within the range specified for the SCC entered. Table 7.1.1.f of this section contains the valid heat content ranges.

81. WARNING - ASH CONT MUST BE BLANK
Explanation: The Fuel Ash Content must be blank or 0 as required by the SCC entered.

82. WARNING - SULF CONT MUST BE BLANK
Explanation: The Fuel Sulphur Content must be blank or 0 as required by the SCC entered.

83. WARNING - HEAT CONT MUST BE BLANK
Explanation: The Fuel Heat Content must be blank or 0 as required by the SCC entered.

84. WARNING - BLANK COMMENTS FIELD
Explanation: If the SCC ends in 97, 98, or 99 (general), a description of the process and rate must be reported in the comments field.

85. WARNING-INVALID SOURCE CODE FOR SCC

Explanation: The source code is not valid for the SCC entered.

86. WARNING-CONFID. CHANGED TO 1

Explanation: If the confidentiality code is something other than 1 or 2, then it is changed to 1.

100. SOURCE CODE > 64-COMMENTS BLANK

Explanation: If the source code in an area source card number 7 is greater than 64, the comments field may not be blank for an add transaction.

101. _____MAX EXCEEDED IN SULFUR CONT. %

Explanation: The allowed maximum values are:

Anthracite Coal	2
Bituminous Coal	7
Distillate Oil	1
Residual Oil	5

102. _____MAX EXCEEDED IN ASH CONTENT %

Explanation: The allowed maximum values are:

Anthracite Coal	25
Bituminous Coal	25

125. V TYPE RECORD SCC MUST BE NUMERIC

Explanation: The SCC in Unverified Point Source is not checked against the NEDS-EM-FACT file but must be all numeric.

APPENDIX C

STATE EMISSIONS SUMMARIES

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Alabama

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	586,830	240,407	15,508
- Area	18,523	32,484	39,452
External Combustion	604,929	267,566	54,699
Residential (Area)	1,702	4,396	38,809
Coal	1,086	82	292
Oil	426	258	4
Natural Gas	10	2,750	143
Wood	180	1,306	38,370
Electric Gen. (Point)	532,265	201,994	6,662
Coal	531,991	201,396	6,542
Oil	248	175	7
Natural Gas	0	217	3
Other	26	206	110
Industrial - Point	54,050	32,894	8,480
- Area	3,929	23,662	531
Coal	36,835	16,735	428
Oil	12,798	3,642	86
Natural Gas	6,003	30,524	655
Other	2,343	5,655	7,842
Comm/Instit - Point	91	194	105
- Area	12,892	4,426	112
Coal	1,170	302	6
Oil	11,791	2,872	46
Natural Gas	5	1,363	63
Other	17	83	102
Internal Comb. (Point)	424	5,325	261
Electric Gen. (Oil)	245	116	10
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	14	3,332	149
Industrial (Other)	165	1,877	102
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	100,229	23,303	58,650
Chemical Manufacturing	17,214	1,600	20,442
Food/Agriculture	0	0	0
Primary Metals	3,725	1,624	8,524
Secondary Metals	4,687	514	496
Mineral Products	5,085	7,590	623
Petroleum Industry	ERR	845	2,907
Wood Products	21,558	10,687	2,648
Organic Solvent Evap	0	18	17,428
Petroleum Storage/Trans	4	4	1,953
Other/Not Classified	1,794	421	3,629
SOLID WASTE DISPOSAL - Point	76	250	188
- Area	256	1,703	14,604
Residential (Area)	254	1,636	14,263
Other	78	317	529
TRANSPORTATION (Area)	14,612	168,636	142,540
Gasoline Vehicles	4,727	92,941	111,873
Diesel Fuel Vehicles	6,485	56,393	8,635
Rail	2,061	13,357	3,243
Aircraft	329	2,704	5,482
Vessels	1,010	3,241	13,307
MISCELLANEOUS AREA	75	2,274	101,054
Forest Fires	0	65	331
Structural Fires	0	95	773
Forest Managed Burning	75	1,961	7,005
Agricultural Burning	0	153	995
Solvent Evap. Loss	0	0	74,401
Gasoline Stn. Evap. Loss	0	0	17,549
ADDITIONAL AREA	0	0	138,377
TSDFs	0	0	110,608
Petroleum Fugitives	0	0	6,015
Bulk Terminals/Plants	0	0	9,713
Other	0	0	12,041
GRAND TOTAL	720,601	469,057	510,373
- POINT	687,135	263,960	74,346
- AREA	33,466	205,097	436,027

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TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Arizona

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point.....	118,000	73,613	2,197
- Area......	14,408	44,156	15,305
External Combustion........	132,319	116,741	17,329
Residential (Area).......	87	2,175	14,575
Coal..................	0	0	0
Oil	12	5	0
Natural Gas...........	8	1,677	90
Wood..................	67	493	14,485
Electric Gen. (Point)...	117,825	71,743	1,904
Coal..................	117,405	69,120	1,890
Oil	417	663	7
Natural Gas...........	3	1,960	7
Other.................	0	0	0
Industrial - Point......	65	640	119
- Area.......	13,879	40,525	662
Coal	13,039	16,219	58
Oil	832	628	20
Natural Gas...........	9	23,877	587
Other.................	64	441	116
Comm/Instit - Point.....	21	202	1
- Area......	442	1,456	68
Coal..................	21	135	1
Oil	436	203	3
Natural Gas...........	6	1,320	65
Other.................	0	0	0
Internal Comb. (Point)....	89	1,028	173
Electric Gen. (Oil).....	7	11	2
Electric Gen. (N. Gas)..	37	589	105
Industrial (Nat. Gas)...	0	9	0
Industrial (Other)......	0	0	0
Commercial/Inst.........	0	0	0
Engine Testing..........	45	419	66
INDUSTRIAL PROCESS (Point)	556,557	1,836	1,461
Chemical Manufacturing....	52,425	32	294
Food/Agriculture..........	0	0	0
Primary Metals............	501,188	610	0
Secondary Metals..........	0	4	0
Mineral Products..........	1,100	455	1
Petroleum Industry........	92	74	217
Wood Products.............	1,507	620	0
Organic Solvent Evap......	0	0	330
Petroleum Storage/Trans...	0	0	618
Other/Not Classified......	245	41	1
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	148	619	8,131
Residential (Area)........	87	451	7,413
Other.....................	61	168	718
TRANSPORTATION (Area).......	10,202	122,486	107,878
Gasoline Vehicles.........	3,947	73,545	90,411
Diesel Fuel Vehicles......	4,321	35,572	5,563
Rail......................	1,502	9,753	2,367
Aircraft..................	398	3,419	5,201
Vessels...................	34	197	4,336
MISCELLANEOUS AREA..........	100	2,760	75,973
Forest Fires..............	10	294	1,410
Structural Fires..........	0	49	398
Forest Managed Burning....	90	2,417	8,645
Agricultural Burning......	0	0	0
Solvent Evap. Loss........	0	0	50,902
Gasoline Stn. Evap. Loss..	0	0	14,618
ADDITIONAL AREA.............			14,355
TSDFs.....................			6,163
Petroleum Fugitives.......			0
Bulk Terminals/Plants.....			2,662
Other.....................			5,530
GRAND TOTAL	699,415	245,470	225,300
- POINT	674,557	75,449	3,658
- AREA	24,858	170,021	221,642

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Arkansas

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	67,397	61,531	2,014
- Area	14,770	33,820	25,464
External Combustion	82,167	93,659	27,394
Residential (Area)	293	3,534	24,781
Coal	0	0	0
Oil	168	119	0
Natural Gas	8	2,576	139
Wood	117	837	24,642
Electric Gen. (Point)	60,383	49,476	85
Coal	60,314	47,946	81
Oil	67	28	0
Natural Gas	2	1,502	4
Other	0	0	0
Industrial - Point	7,014	10,363	1,845
- Area	13,022	27,940	611
Coal	4,400	2,019	3
Oil	14,276	3,422	19
Natural Gas	24	25,684	594
Other	1,336	7,178	1,840
Comm/Instit - Point	0	0	0
- Area	1,455	2,346	72
Coal	0	0	0
Oil	1,452	1,008	9
Natural Gas	3	1,338	63
Other	0	0	0
Internal Comb. (Point)	0	1,692	84
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	1,692	84
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	15,860	9,123	20,678
Chemical Manufacturing	3,374	2,248	5,338
Food/Agriculture	0	0	174
Primary Metals	0	0	2
Secondary Metals	9	3	2,109
Mineral Products	1,177	1,624	10
Petroleum Industry	7,354	1,458	4,125
Wood Products	3,831	3,785	1,730
Organic Solvent Evap	0	5	4,372
Petroleum Storage/Trans	0	0	2,318
Other/Not Classified	115	0	500
SOLID WASTE DISPOSAL - Point	40	102	139
- Area	174	1,112	7,179
Residential (Area)	154	1,056	7,033
Other	60	158	285
TRANSPORTATION (Area)	11,233	131,505	87,128
Gasoline Vehicles	2,829	53,409	58,837
Diesel Fuel Vehicles	7,387	71,225	10,210
Rail	689	4,460	1,081
Aircraft	107	968	1,705
Vessels	221	1,443	15,295
MISCELLANEOUS AREA	4	571	63,457
Forest Fires	0	8	59
Structural Fires	0	48	432
Forest Managed Burning	4	515	1,838
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	50,458
Gasoline Stn. Evap. Loss	0	0	10,670
ADDITIONAL AREA			17,541
TSDFs			128
Petroleum Fugitives			2,962
Bulk Terminals/Plants			6,685
Other			7,766
GRAND TOTAL	109,478	237,764	223,600
- POINT	83,297	70,756	22,831
- AREA	26,181	167,008	200,769

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

California

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	34,359	169,304	11,161
- Area	14,404	91,153	80,219
External Combustion	48,017	191,116	84,585
Residential (Area)	932	30,475	78,631
Coal	210	43	153
Oil	196	80	0
Natural Gas	162	27,732	1,470
Wood	364	2,620	77,008
Electric Gen. (Point)	4,526	45,539	939
Coal	0	0	0
Oil	2,789	2,476	155
Natural Gas	1,728	42,117	772
Other	9	946	12
Industrial - Point	28,234	52,660	3,403
- Area	9,397	48,341	1,025
Coal	5,917	8,479	27
Oil	26,838	26,244	662
Natural Gas	3,303	53,599	1,186
Other	1,573	12,679	2,553
Comm/Instit - Point	853	1,764	24
- Area	4,075	12,337	563
Coal	165	123	3
Oil	4,323	2,491	35
Natural Gas	278	10,633	541
Other	162	854	8
Internal Comb. (Point)	746	69,341	6,795
Electric Gen. (Oil)	101	587	56
Electric Gen. (N. Gas)	49	4,000	256
Industrial (Nat. Gas)	78	58,649	5,178
Industrial (Other)	350	2,481	766
Commercial/Inst	140	3,524	488
Engine Testing	28	100	51
INDUSTRIAL PROCESS (Point)	47,853	61,132	85,680
Chemical Manufacturing	4,245	1,959	3,994
Food/Agriculture	15	198	1,159
Primary Metals	0	199	6
Secondary Metals	270	219	391
Mineral Products	7,684	29,738	359
Petroleum Industry	33,590	26,499	27,913
Wood Products	1,357	719	839
Organic Solvent Evap	0	296	38,599
Petroleum Storage/Trans	0	3	8,983
Other/Not Classified	692	1,302	3,437
SOLID WASTE DISPOSAL - Point	275	300	348
- Area	675	2,836	71,085
Residential (Area)	618	2,659	70,415
Other	332	477	1,018
TRANSPORTATION (Area)	128,398	902,728	809,385
Gasoline Vehicles	31,951	538,071	701,491
Diesel Fuel Vehicles	33,328	276,727	44,069
Rail	7,283	47,282	11,481
Aircraft	1,679	14,457	21,283
Vessels	54,157	26,191	31,561
MISCELLANEOUS AREA	554	17,110	714,064
Forest Fires	332	8,863	42,540
Structural Fires	0	563	4,493
Forest Managed Burning	222	5,943	21,237
Agricultural Burning	0	1,741	11,328
Solvent Evap. Loss	0	0	526,516
Gasoline Stn. Evap. Loss	0	0	107,950
ADDITIONAL AREA	0	0	339,377
TSDFs	0	0	161,936
Petroleum Fugitives	0	0	117,493
Bulk Terminals/Plants	0	0	23,845
Other	0	0	36,103
GRAND TOTAL	226,518	1,244,563	2,111,819
- POINT	82,487	230,736	97,189
- AREA	144,031	1,013,827	2,014,630

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* California maintains an extensive area source inventory that is not compatible with the NEDS. California area source totals from their State system are 87 x 10^3 TPY SO_2, 826 x 10^3 TPY NO_x, and 1,154 x 10^3 TPY VOC.

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Colorado

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point.....	71,687	130,975	1,223
- Area......	4,811	29,673	31,514
External Combustion.......	76,474	148,698	32,267
Residential (Area).......	853	6,059	30,902
Coal..................	556	103	349
Oil...................	135	54	1
Natural Gas...........	24	4,874	259
Wood..................	138	1,028	30,293
Electric Gen. (Point)...	66,623	111,335	510
Coal..................	66,582	109,844	507
Oil	33	17	0
Natural Gas...........	0	1,472	3
Other.................	8	2	0
Industrial - Point......	3,889	2,880	104
- Area.......	2,731	20,032	451
Coal	3,908	3,537	12
Oil	1,093	480	7
Natural Gas...........	11	18,857	534
Other.................	1,608	88	2
Comm/Instit - Point.....	1,151	4,810	139
- Area......	1,227	3,532	161
Coal..................	1,095	635	11
Oil	1,249	447	5
Natural Gas...........	33	7,260	282
Other.................	1	0	2
Internal Comb. (Point)....	24	11,950	470
Electric Gen. (Oil).....	24	213	17
Electric Gen. (N. Gas)..	0	320	10
Industrial (Nat. Gas)...	0	10,282	389
Industrial (Other)......	0	0	0
Commercial/Inst.........	0	1,135	54
Engine Testing..........	0	0	0
INDUSTRIAL PROCESS (Point)	4,635	2,059	4,873
Chemical Manufacturing....	0	0	9
Food/Agriculture..........	0	0	0
Primary Metals............	0	0	0
Secondary Metals..........	0	0	0
Mineral Products..........	1,857	1,580	17
Petroleum Industry........	2,543	461	746
Wood Products.............	0	0	0
Organic Solvent Evap......	0	0	2,135
Petroleum Storage/Trans...	0	0	1,911
Other/Not Classified......	235	18	55
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	109	611	9,223
Residential (Area)........	95	587	9,182
Other.....................	14	24	41
TRANSPORTATION (Area).......	10,152	127,445	146,968
Gasoline Vehicles.........	3,893	75,393	129,923
Diesel Fuel Vehicles......	4,016	36,564	7,369
Rail......................	1,846	11,972	2,906
Aircraft..................	384	3,409	4,356
Vessels...................	13	107	2,414
MISCELLANEOUS AREA..........	39	1,079	73,150
Forest Fires..............	0	92	450
Structural Fires..........	0	60	490
Forest Managed Burning....	39	927	3,324
Agricultural Burning......	0	0	0
Solvent Evap. Loss........	0	0	54,511
Gasoline Stn. Evap. Loss..	0	0	14,375
ADDITIONAL AREA.............			27,229
TSDFs.....................			731
Petroleum Fugitives.......			3,577
Bulk Terminals/Plants.....			5,779
Other.....................			17,142
GRAND TOTAL	91,433	291,842	294,180
- POINT	76,322	133,034	6,096
- AREA	15,111	158,808	288,084

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Connecticut

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	70,917	28,831	440
- Area	9,767	12,176	35,929
External Combustion	80,622	39,613	36,256
Residential (Area)	6,321	6,808	35,787
Coal	80	9	29
Oil	6,064	3,802	148
Natural Gas	10	1,790	94
Wood	167	1,207	35,516
Electric Gen. (Point)	60,897	23,419	299
Coal	10,517	6,953	27
Oil	50,380	16,252	271
Natural Gas	0	214	1
Other	0	0	0
Industrial - Point	7,362	2,956	11
- Area	517	2,017	47
Coal	0	87	0
Oil	7,808	3,036	29
Natural Gas	3	1,803	29
Other	68	47	0
Comm/Instit - Point	2,596	1,062	17
- Area	2,929	3,351	95
Coal	440	159	0
Oil	5,080	2,947	48
Natural Gas	5	1,307	64
Other	0	0	0
Internal Comb. (Point)	62	1,394	113
Electric Gen. (Oil)	2	10	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	254	6
Industrial (Other)	0	3	0
Commercial/Inst	0	0	0
Engine Testing	60	1,127	107
INDUSTRIAL PROCESS (Point)	67	107	3,424
Chemical Manufacturing	1	0	335
Food/Agriculture	0	0	451
Primary Metals	0	19	0
Secondary Metals	0	0	0
Mineral Products	65	53	20
Petroleum Industry	0	0	0
Wood Products	0	32	1
Organic Solvent Evap	1	1	1,153
Petroleum Storage/Trans	0	0	565
Other/Not Classified	0	2	899
SOLID WASTE DISPOSAL - Point	228	323	133
- Area	82	468	5,327
Residential (Area)	80	466	5,323
Other	230	325	137
TRANSPORTATION (Area)	6,222	85,907	75,148
Gasoline Vehicles	3,433	64,428	68,028
Diesel Fuel Vehicles	2,589	19,904	2,903
Rail	51	335	81
Aircraft	110	1,003	1,010
Vessels	39	237	3,126
MISCELLANEOUS AREA	0	89	95,834
Forest Fires	0	0	0
Structural Fires	0	89	712
Forest Managed Burning	0	0	0
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	82,500
Gasoline Stn. Evap. Loss	0	0	12,622
ADDITIONAL AREA			16,209
TSDFs			5,590
Petroleum Fugitives			0
Bulk Terminals/Plants			3,632
Other			6,986
GRAND TOTAL	87,283	127,901	232,444
- POINT	71,212	29,261	3,997
- AREA	16,071	98,640	228,447

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Delaware

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	82,318	39,389	204
- Area	1,786	2,729	7,892
External Combustion	84,104	42,118	8,096
Residential (Area)	1,030	1,333	7,861
Coal	10	1	4
Oil	982	616	24
Natural Gas	2	450	24
Wood	36	266	7,809
Electric Gen. (Point)	59,066	29,508	127
Coal	48,921	25,450	85
Oil	10,145	3,649	41
Natural Gas	0	227	1
Other	0	182	0
Industrial - Point	22,433	9,570	69
- Area	449	1,074	20
Coal	7,966	2,315	8
Oil	5,595	1,876	31
Natural Gas	111	1,319	24
Other	9,210	5,134	26
Comm/Instit - Point	819	311	8
- Area	307	322	11
Coal	105	25	1
Oil	1,020	376	10
Natural Gas	1	232	8
Other	0	0	0
Internal Comb. (Point)	0	0	0
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	0	0
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	31,476	2,575	7,619
Chemical Manufacturing	2,673	9	483
Food/Agriculture	0	0	0
Primary Metals	0	0	0
Secondary Metals	0	0	0
Mineral Products	0	0	0
Petroleum Industry	28,803	2,566	1,234
Wood Products	0	0	0
Organic Solvent Evap	0	0	5,374
Petroleum Storage/Trans	0	0	442
Other/Not Classified	0	0	66
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	39	189	981
Residential (Area)	24	167	947
Other	15	22	34
TRANSPORTATION (Area)	1,946	23,566	21,013
Gasoline Vehicles	826	16,100	17,127
Diesel Fuel Vehicles	832	6,991	1,033
Rail	10	63	16
Aircraft	29	231	510
Vessels	249	181	2,327
MISCELLANEOUS AREA	0	19	16,118
Forest Fires	0	0	0
Structural Fires	0	15	123
Forest Managed Burning	0	3	13
Agricultural Burning	0	1	12
Solvent Evap. Loss	0	0	12,891
Gasoline Stn. Evap. Loss	0	0	3,079
ADDITIONAL AREA			14,513
TSDFs			79
Petroleum Fugitives			7,420
Bulk Terminals/Plants			1,137
Other			5,877
GRAND TOTAL	117,565	68,467	68,340
- POINT	113,794	41,964	7,823
- AREA	3,771	26,503	60,517

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Dist. of Col.

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point......	3,617	1,549	34
- Area......	2,209	2,654	945
External Combustion........	5,826	4,203	979
Residential (Area).......	793	1,121	893
Coal..................	482	42	141
Oil	303	190	7
Natural Gas...........	5	865	46
Wood..................	3	24	699
Electric Gen. (Point)...	654	263	3
Coal..................	0	0	0
Oil	654	263	3
Natural Gas...........	0	0	0
Other.................	0	0	0
Industrial - Point......	123	17	0
- Area.......	4	476	12
Coal	0	0	0
Oil	127	18	0
Natural Gas...........	0	475	12
Other.................	0	0	0
Comm/Instit - Point.....	2,840	1,269	31
- Area......	1,412	1,057	40
Coal..................	1,623	604	24
Oil	2,626	909	17
Natural Gas...........	3	813	30
Other.................	0	0	0
Internal Comb. (Point)....	0	0	0
Electric Gen. (Oil).....	0	0	0
Electric Gen. (N. Gas)..	0	0	0
Industrial (Nat. Gas)...	0	0	0
Industrial (Other)......	0	0	0
Commercial/Inst.........	0	0	0
Engine Testing..........	0	0	0
INDUSTRIAL PROCESS (Point)	0	2	537
Chemical Manufacturing....	0	0	0
Food/Agriculture..........	0	0	0
Primary Metals............	0	0	0
Secondary Metals..........	0	0	0
Mineral Products..........	0	0	0
Petroleum Industry........	0	0	0
Wood Products.............	0	0	0
Organic Solvent Evap......	0	2	537
Petroleum Storage/Trans...	0	0	0
Other/Not Classified......	0	0	0
SOLID WASTE DISPOSAL - Point	116	139	69
- Area	126	188	331
Residential (Area)........	1	1	102
Other.....................	241	326	298
TRANSPORTATION (Area).......	1,303	15,892	14,102
Gasoline Vehicles.........	512	9,330	12,087
Diesel Fuel Vehicles......	458	4,057	605
Rail......................	206	1,336	324
Aircraft..................	125	1,159	874
Vessels...................	2	10	212
MISCELLANEOUS AREA..........	0	21	11,560
Forest Fires..............	0	0	0
Structural Fires..........	0	21	170
Forest Managed Burning....	0	0	0
Agricultural Burning......	0	0	0
Solvent Evap. Loss........	0	0	8,881
Gasoline Stn. Evap. Loss..	0	0	2,509
ADDITIONAL AREA.............			608
TSDFs.....................			0
Petroleum Fugitives.......			0
Bulk Terminals/Plants.....			398
Other.....................			210
GRAND TOTAL	7,371	20,445	28,186
- POINT	3,733	1,690	640
- AREA	3,638	18,755	27,546

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Florida

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	553,105	273,603	6,952
- Area	14,140	21,491	37,445
External Combustion	562,465	283,024	43,358
Residential (Area)	890	3,725	37,012
Coal	140	14	43
Oil	572	358	10
Natural Gas	7	2,101	107
Wood	171	1,252	36,852
Electric Gen. (Point)	526,706	247,209	1,430
Coal	430,541	182,267	637
Oil	95,992	29,391	310
Natural Gas	52	34,144	96
Other	121	1,407	387
Industrial - Point	21,288	14,167	4,473
- Area	1,000	11,879	270
Coal	5,525	3,192	23
Oil	16,277	4,684	21
Natural Gas	21	13,849	330
Other	465	4,321	4,369
Comm/Instit - Point	331	157	10
- Area	12,250	5,887	163
Coal	1,887	629	24
Oil	10,686	3,859	62
Natural Gas	8	1,551	79
Other	0	5	8
Internal Comb. (Point)	4,780	12,070	1,039
Electric Gen. (Oil)	4,061	1,036	56
Electric Gen. (N. Gas)	146	7,128	249
Industrial (Nat. Gas)	0	3,178	672
Industrial (Other)	573	728	62
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	57,529	16,266	9,035
Chemical Manufacturing	29,177	3,231	2,432
Food/Agriculture	0	0	0
Primary Metals	0	0	0
Secondary Metals	1,438	28	78
Mineral Products	13,474	6,067	51
Petroleum Industry	5,425	78	1,924
Wood Products	6,191	6,607	2,029
Organic Solvent Evap	3	57	2,092
Petroleum Storage/Trans	0	0	429
Other/Not Classified	1,821	198	
SOLID WASTE DISPOSAL - Point	405	498	1,024
- Area	221	1,461	8,552
Residential (Area)	212	1,442	8,486
Other	414	517	1,090
TRANSPORTATION (Area)	35,936	358,055	353,505
Gasoline Vehicles	13,442	226,241	276,654
Diesel Fuel Vehicles	11,674	99,557	15,007
Rail	1,821	11,800	2,863
Aircraft	1,470	12,404	20,630
Vessels	7,529	8,053	38,351
MISCELLANEOUS AREA	310	10,165	275,313
Forest Fires	5	274	1,310
Structural Fires	0	186	1,526
Forest Managed Burning	305	8,111	28,995
Agricultural Burning	0	1,594	10,358
Solvent Evap. Loss	0	0	182,692
Gasoline Stn. Evap. Loss	0	0	50,432
ADDITIONAL AREA			45,478
TSDFs			501
Petroleum Fugitives			530
Bulk Terminals/Plants			13,396
Other			31,051
GRAND TOTAL	661,646	681,539	737,304
- POINT	611,039	290,367	17,011
- AREA	50,607	391,172	720,293

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Georgia

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	1,048,658	274,609	8,436
- Area	2,896	17,859	45,067
External Combustion	1,051,554	292,009	53,484
Residential (Area)	515	6,836	44,780
Coal	0	0	0
Oil	282	160	2
Natural Gas	19	5,167	264
Wood	214	1,509	44,514
Electric Gen. (Point)	998,097	232,474	992
Coal	997,170	230,729	985
Oil	924	193	4
Natural Gas	3	1,552	3
Other	0	0	0
Industrial - Point	49,620	40,719	7,415
- Area	7	7,561	162
Coal	16,804	10,520	84
Oil	30,572	7,134	60
Natural Gas	177	17,531	247
Other	2,074	13,095	7,186
Comm/Instit - Point	941	957	10
- Area	2,374	3,462	125
Coal	889	586	2
Oil	2,416	1,057	14
Natural Gas	10	2,776	119
Other	0	0	0
Internal Comb. (Point)	0	459	19
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	459	19
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	35,899	17,745	27,747
Chemical Manufacturing	5,292	2,197	3,569
Food/Agriculture	0	0	0
Primary Metals	2,820	1,132	171
Secondary Metals	1,270	4	137
Mineral Products	4,775	3,841	1,040
Petroleum Industry	29	11	0
Wood Products	19,672	10,184	5,756
Organic Solvent Evap	0	0	12,504
Petroleum Storage/Trans	0	0	3,621
Other/Not Classified	2,041	376	949
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	315	2,204	11,918
Residential (Area)	298	2,009	11,131
Other	17	195	787
TRANSPORTATION (Area)	23,612	270,358	213,092
Gasoline Vehicles	8,360	156,503	176,653
Diesel Fuel Vehicles	11,333	93,172	14,322
Rail	2,234	14,507	3,516
Aircraft	494	4,546	5,002
Vessels	1,191	1,630	13,599
MISCELLANEOUS AREA	248	7,761	182,001
Forest Fires	0	4	152
Structural Fires	0	113	1,024
Forest Managed Burning	248	6,812	24,355
Agricultural Burning	0	832	5,438
Solvent Evap. Loss	0	0	121,684
Gasoline Stn. Evap. Loss	0	0	29,348
ADDITIONAL AREA	0	0	99,694
TSDFs	0	0	66,308
Petroleum Fugitives	0	0	1,802
Bulk Terminals/Plants	0	0	11,622
Other	0	0	19,962
GRAND TOTAL	1,111,628	590,536	587,955
- POINT	1,084,557	292,354	36,183
- AREA	27,071	298,182	551,772

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Idaho

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	3,384	4,636	733
- Area	7,547	8,791	21,450
External Combustion	10,931	13,287	22,132
Residential (Area)	1,260	1,465	21,319
Coal	208	19	69
Oil	955	243	5
Natural Gas	1	485	21
Wood	96	718	21,224
Electric Gen. (Point)	6	118	59
Coal	0	0	0
Oil	0	0	0
Natural Gas	0	0	0
Other	6	118	59
Industrial - Point	3,090	4,177	623
- Area	5,050	6,509	110
Coal	6,281	4,337	11
Oil	1,793	559	5
Natural Gas	1	4,570	107
Other	65	1,220	610
Comm/Instit - Point	288	201	0
- Area	1,237	817	21
Coal	460	256	1
Oil	1,063	300	1
Natural Gas	2	462	19
Other	0	0	0
Internal Comb. (Point)	0	140	51
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	140	51
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	20,890	1,796	324
Chemical Manufacturing	16,083	853	0
Food/Agriculture	0	0	0
Primary Metals	0	0	0
Secondary Metals	0	0	0
Mineral Products	3,680	288	2
Petroleum Industry	0	0	0
Wood Products	1,127	433	0
Organic Solvent Evap	0	0	0
Petroleum Storage/Trans	0	0	322
Other/Not Classified	0	222	0
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	64	390	4,193
Residential (Area)	64	389	4,192
Other	0	1	1
TRANSPORTATION (Area)	4,085	49,736	41,927
Gasoline Vehicles	1,119	23,492	33,811
Diesel Fuel Vehicles	2,273	21,507	3,677
Rail	596	3,848	931
Aircraft	82	782	1,119
Vessels	15	107	2,389
MISCELLANEOUS AREA	839	22,405	114,441
Forest Fires	475	12,688	60,900
Structural Fires	0	13	160
Forest Managed Burning	364	9,684	34,616
Agricultural Burning	0	20	133
Solvent Evap. Loss	0	0	14,510
Gasoline Stn. Evap. Loss	0	0	4,122
ADDITIONAL AREA			4,854
TSDFs			0
Petroleum Fugitives			0
Bulk Terminals/Plants			3,974
Other			880
GRAND TOTAL	36,809	87,754	187,922
- POINT	24,274	6,432	1,057
- AREA	12,535	81,322	186,865

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Illinois

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	1,180,566	519,282	12,823
- Area	8,761	62,198	91,900
External Combustion	1,187,654	563,886	99,438
Residential (Area)	2,502	27,912	90,852
Coal	70	6	24
Oil	1,885	1,182	39
Natural Gas	129	23,678	1,257
Wood	418	3,046	89,532
Electric Gen. (Point)	1,016,344	425,305	5,223
Coal	1,007,683	415,776	5,114
Oil	8,656	6,371	74
Natural Gas	5	3,158	35
Other	0	0	0
Industrial - Point	145,472	71,222	2,113
- Area	1,556	21,834	484
Coal	128,563	31,936	824
Oil	11,297	9,739	474
Natural Gas	911	39,005	1,002
Other	6,257	12,376	297
Comm/Instit - Point	17,077	5,161	202
- Area	4,703	12,452	564
Coal	14,293	2,254	130
Oil	7,311	3,341	49
Natural Gas	173	11,968	585
Other	3	50	2
Internal Comb. (Point)	1,673	17,594	5,285
Electric Gen. (Oil)	1,568	3,718	67
Electric Gen. (N. Gas)	7	664	233
Industrial (Nat. Gas)	7	12,786	4,950
Industrial (Other)	44	107	10
Commercial/Inst	0	0	0
Engine Testing	47	319	25
INDUSTRIAL PROCESS (Point)	180,504	45,377	150,743
Chemical Manufacturing	32,145	1,726	15,760
Food/Agriculture	276	154	9,906
Primary Metals	16,030	3,221	3,207
Secondary Metals	777	2,407	325
Mineral Products	19,202	7,531	287
Petroleum Industry	110,509	28,111	9,436
Wood Products	0	0	3
Organic Solvent Evap	30	388	80,508
Petroleum Storage/Trans	119	0	26,792
Other/Not Classified	1,416	1,839	4,519
SOLID WASTE DISPOSAL - Point	529	695	359
- Area	413	2,303	33,443
Residential (Area)	413	2,303	33,443
Other	529	695	359
TRANSPORTATION (Area)	27,061	341,385	290,104
Gasoline Vehicles	11,088	211,074	252,408
Diesel Fuel Vehicles	10,189	90,845	12,933
Rail	4,645	30,122	7,311
Aircraft	546	5,045	4,955
Vessels	593	4,299	12,497
MISCELLANEOUS AREA	0	310	297,555
Forest Fires	0	0	0
Structural Fires	0	310	2,487
Forest Managed Burning	0	0	0
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	250,293
Gasoline Stn. Evap. Loss	0	0	44,775
ADDITIONAL AREA			80,143
TSDFs			0
Petroleum Fugitives			43,512
Bulk Terminals/Plants			13,796
Other			22,835
GRAND TOTAL	1,397,834	971,550	957,070
- POINT	1,361,599	565,354	163,925
- AREA	36,235	406,196	793,145

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Indiana

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	1,621,820	528,722	2,219
- Area	137,568	57,490	80,879
External Combustion	1,759,348	571,609	82,612
Residential (Area)	8,039	12,400	80,328
Coal	5,672	264	855
Oil	1,963	1,232	38
Natural Gas	36	8,220	431
Wood	368	2,684	79,004
Electric Gen. (Point)	1,515,500	471,405	1,382
Coal	1,515,211	470,988	1,382
Oil	289	187	0
Natural Gas	0	230	0
Other	0	0	0
Industrial - Point	83,303	40,074	334
- Area	121,002	39,110	330
Coal	181,437	48,314	207
Oil	13,603	4,962	80
Natural Gas	37	15,705	223
Other	9,228	10,203	154
Comm/Instit - Point	22,977	2,640	17
- Area	8,527	5,980	221
Coal	27,259	3,285	42
Oil	4,230	1,821	14
Natural Gas	15	3,514	182
Other	0	0	0
Internal Comb. (Point)	40	14,603	486
Electric Gen. (Oil)	19	28	0
Electric Gen. (N. Gas)	0	1	0
Industrial (Nat. Gas)	0	12,574	424
Industrial (Other)	5	77	5
Commercial/Inst	0	1,687	41
Engine Testing	16	236	16
INDUSTRIAL PROCESS (Point)	82,164	41,721	92,596
Chemical Manufacturing	3,557	2,279	8,468
Food/Agriculture	80	1,481	6,832
Primary Metals	43,461	12,031	14,240
Secondary Metals	6,787	1,274	924
Mineral Products	4,673	7,500	1,943
Petroleum Industry	11,681	3,941	4,869
Wood Products	4	1	0
Organic Solvent Evap	2	79	49,474
Petroleum Storage/Trans	0	0	4,505
Other/Not Classified	11,919	13,135	1,341
SOLID WASTE DISPOSAL - Point	93	686	469
- Area	542	2,518	21,974
Residential (Area)	330	2,106	21,040
Other	305	1,098	1,403
TRANSPORTATION (Area)	22,408	249,411	174,503
Gasoline Vehicles	6,376	126,592	145,344
Diesel Fuel Vehicles	10,870	89,097	12,102
Rail	4,891	31,710	7,705
Aircraft	146	1,384	1,718
Vessels	125	628	7,634
MISCELLANEOUS AREA	0	156	156,758
Forest Fires	0	0	0
Structural Fires	0	156	1,238
Forest Managed Burning	0	0	0
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	132,198
Gasoline Stn. Evap. Loss	0	0	23,322
ADDITIONAL AREA	0	0	44,499
TSDFs	0	0	0
Petroleum Fugitives	0	0	22,583
Bulk Terminals/Plants	0	0	11,061
Other	0	0	10,855
GRAND TOTAL	1,864,595	880,704	573,897
- POINT	1,704,077	571,129	95,284
- AREA	160,518	309,575	478,613

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Iowa

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	264,684	91,771	457
- Area	5,933	21,657	9,656
External Combustion	270,603	113,204	10,105
Residential (Area)	1,036	6,003	9,181
Coal	25	5	94
Oil	963	607	27
Natural Gas	17	5,089	329
Wood	31	302	8,731
Electric Gen. (Point)	196,066	76,076	392
Coal	196,027	75,551	382
Oil	39	10	0
Natural Gas	0	362	0
Other	0	153	10
Industrial - Point	55,122	13,905	47
- Area	3,773	12,607	313
Coal	57,454	10,641	68
Oil	1,431	404	7
Natural Gas	9	15,452	284
Other	1	15	1
Comm/Instit - Point	13,482	1,566	10
- Area	1,124	3,047	162
Coal	13,772	1,543	15
Oil	826	569	4
Natural Gas	8	2,501	153
Other	0	0	0
Internal Comb. (Point)	14	224	8
Electric Gen. (Oil)	10	11	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	140	3
Industrial (Other)	1	34	2
Commercial/Inst	0	0	0
Engine Testing	3	39	3
INDUSTRIAL PROCESS (Point)	7,324	7,365	6,858
Chemical Manufacturing	16	4,288	645
Food/Agriculture	61	35	3
Primary Metals	0	0	0
Secondary Metals	22	282	13
Mineral Products	4,614	2,314	4
Petroleum Industry	0	0	0
Wood Products	14	22	6
Organic Solvent Evap	0	3	3,961
Petroleum Storage/Trans	0	0	16
Other/Not Classified	2,597	421	2,210
SOLID WASTE DISPOSAL - Point	33	31	7
- Area	450	1,733	14,532
Residential (Area)	216	1,393	14,014
Other	267	371	525
TRANSPORTATION (Area)	11,250	142,459	98,945
Gasoline Vehicles	3,205	69,027	80,476
Diesel Fuel Vehicles	6,819	65,189	9,457
Rail	1,092	7,103	1,724
Aircraft	78	785	1,009
Vessels	56	355	6,279
MISCELLANEOUS AREA	0	72	62,183
Forest Fires	0	0	0
Structural Fires	0	72	629
Forest Managed Burning	0	0	0
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	49,425
Gasoline Stn. Evap. Loss	0	0	12,129
ADDITIONAL AREA			12,912
TSDFs			0
Petroleum Fugitives			0
Bulk Terminals/Plants			9,097
Other			3,815
GRAND TOTAL	289,674	265,088	205,550
- POINT	272,041	99,167	7,322
- AREA	17,633	165,921	198,228

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Kansas

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point.....	107,761	225,595	2,373
- Area......	1,728	53,391	9,632
External Combustion.......	109,446	212,752	10,185
Residential (Area).......	103	4,803	8,305
Coal..................	14	0	0
Oil	44	34	1
Natural Gas...........	16	4,499	307
Wood..................	29	270	7,997
Electric Gen. (Point)...	103,604	149,377	509
Coal..................	103,512	145,869	501
Oil	88	59	1
Natural Gas...........	4	3,449	7
Other.................	0	0	0
Industrial - Point......	4,114	9,984	44
- Area.......	1,097	45,372	1,155
Coal	2,522	980	36
Oil	2,122	651	33
Natural Gas...........	28	53,136	1,119
Other.................	539	589	11
Comm/Instit - Point.....	0	0	0
- Area......	528	3,216	172
Coal..................	15	0	0
Oil	504	359	16
Natural Gas...........	9	2,857	156
Other.................	0	0	0
Internal Comb. (Point)....	43	66,234	1,820
Electric Gen. (Oil).....	33	437	29
Electric Gen. (N. Gas)..	0	6,496	157
Industrial (Nat. Gas)...	5	59,217	1,629
Industrial (Other)......	5	84	5
Commercial/Inst.........	0	0	0
Engine Testing..........	0	0	0
INDUSTRIAL PROCESS (Point)	37,022	14,715	30,080
Chemical Manufacturing....	2,261	7,280	2,583
Food/Agriculture..........	0	14	1
Primary Metals............	0	0	0
Secondary Metals..........	0	0	0
Mineral Products..........	9,440	2,621	243
Petroleum Industry........	13,593	4,746	7,373
Wood Products.............	0	0	10
Organic Solvent Evap......	0	53	7,415
Petroleum Storage/Trans...	0	0	11,258
Other/Not Classified......	11,728	1	1,197
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	211	1,044	10,393
Residential (Area)........	156	926	10,129
Other.....................	55	118	264
TRANSPORTATION (Area).......	13,795	148,046	91,553
Gasoline Vehicles.........	3,015	61,340	71,364
Diesel Fuel Vehicles......	5,893	54,726	7,603
Rail......................	4,780	31,005	7,534
Aircraft..................	81	806	1,439
Vessels...................	26	169	3,613
MISCELLANEOUS AREA..........	0	549	60,441
Forest Fires..............	0	0	0
Structural Fires..........	0	55	507
Forest Managed Burning....	0	0	0
Agricultural Burning......	0	494	3,208
Solvent Evap. Loss........	0	0	45,627
Gasoline Stn. Evap. Loss..	0	0	11,099
ADDITIONAL AREA.............			39,712
TSDFs.....................			1,071
Petroleum Fugitives.......			16,532
Bulk Terminals/Plants.....			5,982
Other.....................			16,127
GRAND TOTAL	160,517	443,340	244,184
- POINT	144,783	240,310	32,453
- AREA	15,734	203,030	211,731

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Kentucky

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point.....	793,737	275,032	2,057
- Area......	37,758	64,587	81,208
External Combustion........	831,495	335,822	82,728
Residential (Area).......	3,624	7,233	80,077
Coal...................	1,999	123	478
Oil	1,249	783	23
Natural Gas............	9	3,628	187
Wood...................	367	2,699	79,389
Electric Gen. (Point)...	769,853	261,590	975
Coal...................	769,840	261,323	974
Oil	13	15	0
Natural Gas............	0	252	1
Other..................	0	0	0
Industrial - Point.......	21,954	9,066	517
- Area.......	31,739	54,482	1,042
Coal	49,254	20,356	101
Oil	3,743	3,439	97
Natural Gas............	15	38,391	1,133
Other..................	681	1,362	228
Comm/Instit - Point.....	1,930	579	28
- Area......	2,395	2,872	69
Coal...................	3,231	969	34
Oil	1,090	769	5
Natural Gas............	4	1,713	78
Other..................	0	0	0
Internal Comb. (Point)....	0	3,797	537
Electric Gen. (Oil)......	0	0	0
Electric Gen. (N. Gas)..	0	0	0
Industrial (Nat. Gas)...	0	3,797	537
Industrial (Other)......	0	0	0
Commercial/Inst.........	0	0	0
Engine Testing..........	0	0	0
INDUSTRIAL PROCESS (Point)	33,218	13,595	56,089
Chemical Manufacturing....	3,308	522	5,762
Food/Agriculture..........	0	244	21,493
Primary Metals............	7,449	662	77
Secondary Metals..........	105	995	3,228
Mineral Products..........	8,932	6,021	876
Petroleum Industry........	10,678	2,959	1,547
Wood Products.............	1,280	1,176	61
Organic Solvent Evap......	0	37	13,155
Petroleum Storage/Trans...	0	0	5,611
Other/Not Classified......	1,466	979	4,279
SOLID WASTE DISPOSAL - Point	307	153	95
- Area	271	1,762	9,617
Residential (Area)........	246	1,677	9,328
Other.....................	332	238	384
TRANSPORTATION (Area).......	14,141	165,100	119,202
Gasoline Vehicles.........	4,285	88,112	99,450
Diesel Fuel Vehicles......	5,395	46,287	6,151
Rail......................	2,954	19,140	4,646
Aircraft..................	218	1,993	2,541
Vessels...................	1,289	9,568	6,414
MISCELLANEOUS AREA..........	0	93	76,378
Forest Fires..............	0	17	100
Structural Fires..........	0	76	715
Forest Managed Burning....	0	0	0
Agricultural Burning......	0	0	0
Solvent Evap. Loss........	0	0	59,671
Gasoline Stn. Evap. Loss..	0	0	15,892
ADDITIONAL AREA.............			81,161
TSDFs.....................			53,040
Petroleum Fugitives.......			11,601
Bulk Terminals/Plants.....			7,254
Other.....................			9,266
GRAND TOTAL	879,432	520,322	425,807
- POINT	827,262	288,780	58,241
- AREA	52,170	231,542	367,566

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Louisiana

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	127,618	362,182	18,239
- Area	106,186	122,424	19,384
External Combustion	233,340	373,200	25,180
Residential (Area)	198	3,947	16,749
Coal	0	0	0
Oil	109	72	0
Natural Gas	13	3,312	175
Wood	76	563	16,574
Electric Gen. (Point)	79,365	171,560	1,227
Coal	61,078	66,790	724
Oil	17,866	11,698	326
Natural Gas	376	89,892	173
Other	45	3,180	4
Industrial - Point	47,786	78,961	4,559
- Area	88,612	113,085	2,514
Coal	14,688	8,060	15
Oil	106,931	34,467	358
Natural Gas	4,887	134,229	2,709
Other	9,892	15,290	3,991
Comm/Instit - Point	3	255	10
- Area	17,376	5,392	121
Coal	0	0	0
Oil	17,373	4,160	63
Natural Gas	5	1,387	62
Other	1	100	6
Internal Comb. (Point)	464	111,406	12,443
Electric Gen. (Oil)	15	284	3
Electric Gen. (N. Gas)	6	3,106	57
Industrial (Nat. Gas)	412	107,615	12,331
Industrial (Other)	31	401	52
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	134,978	68,858	110,206
Chemical Manufacturing	81,308	33,368	50,266
Food/Agriculture	0	0	972
Primary Metals	11,411	922	8
Secondary Metals	3,896	154	2
Mineral Products	963	1,811	15
Petroleum Industry	26,177	23,904	23,631
Wood Products	7,890	7,092	8,072
Organic Solvent Evap	0	4	2,433
Petroleum Storage/Trans	0	0	24,723
Other/Not Classified	3,333	1,603	84
SOLID WASTE DISPOSAL - Point	299	1,219	26
- Area	209	1,385	9,970
Residential (Area)	209	1,385	9,970
Other	299	1,219	26
TRANSPORTATION (Area)	35,681	204,295	146,022
Gasoline Vehicles	5,294	95,007	104,324
Diesel Fuel Vehicles	6,168	54,570	7,756
Rail	3,098	20,103	4,882
Aircraft	298	2,657	3,618
Vessels	20,823	31,958	25,442
MISCELLANEOUS AREA	41	2,976	95,578
Forest Fires	0	11	54
Structural Fires	0	101	812
Forest Managed Burning	41	1,141	4,076
Agricultural Burning	0	1,723	11,208
Solvent Evap. Loss	0	0	59,474
Gasoline Stn. Evap. Loss	0	0	19,954
ADDITIONAL AREA	0	0	246,458
TSDFs	0	0	79,373
Petroleum Fugitives	0	0	117,140
Bulk Terminals/Plants	0	0	13,826
Other	0	0	36,120
GRAND TOTAL	405,012	763,339	645,883
- POINT	262,895	432,259	128,471
- AREA	142,117	331,080	517,412

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Maine

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	62,185	17,833	2,558
- Area	8,549	4,705	34,255
External Combustion	70,734	22,538	36,813
Residential (Area)	3,522	3,295	34,237
Coal	166	17	58
Oil	3,197	2,005	78
Natural Gas	0	113	5
Wood	159	1,160	34,096
Electric Gen. (Point)	10,428	4,857	55
Coal	0	0	0
Oil	10,428	4,857	55
Natural Gas	0	0	0
Other	0	0	0
Industrial - Point	49,518	12,355	2,492
- Area	130	211	1
Coal	2,349	1,071	4
Oil	47,086	8,085	631
Natural Gas	0	109	0
Other	213	3,301	1,858
Comm/Instit - Point	2,239	621	11
- Area	4,897	1,199	17
Coal	720	213	0
Oil	6,415	1,543	21
Natural Gas	0	61	1
Other	1	3	6
Internal Comb. (Point)	0	0	0
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	0	0
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	4,919	1,583	3,407
Chemical Manufacturing	0	0	0
Food/Agriculture	0	540	1,125
Primary Metals	0	0	0
Secondary Metals	0	0	0
Mineral Products	0	0	0
Petroleum Industry	0	0	0
Wood Products	4,192	989	1,959
Organic Solvent Evap	0	0	0
Petroleum Storage/Trans	0	0	323
Other/Not Classified	727	54	0
SOLID WASTE DISPOSAL - Point	1	0	0
- Area	120	611	4,643
Residential (Area)	84	548	4,524
Other	37	63	119
TRANSPORTATION (Area)	3,456	42,015	35,711
Gasoline Vehicles	1,355	25,796	28,327
Diesel Fuel Vehicles	1,736	13,820	2,064
Rail	218	1,419	345
Aircraft	69	590	940
Vessels	78	390	4,035
MISCELLANEOUS AREA	0	61	28,356
Forest Fires	0	0	0
Structural Fires	0	30	222
Forest Managed Burning	0	0	0
Agricultural Burning	0	31	203
Solvent Evap. Loss	0	0	22,868
Gasoline Stn. Evap. Loss	0	0	5,063
ADDITIONAL AREA			62,172
TSDFs			57,710
Petroleum Fugitives			0
Bulk Terminals/Plants			3,090
Other			1,372
GRAND TOTAL	79,230	66,808	171,102
- POINT	67,105	19,416	5,965
- AREA	12,125	47,392	165,137

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Maryland

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point.....	236,649	81,341	580
- Area......	30,231	18,883	9,312
External Combustion........	266,701	99,165	9,865
Residential (Area).......	15,890	9,536	9,062
Coal..................	3,315	248	822
Oil	12,518	5,077	197
Natural Gas...........	23	3,945	211
Wood..................	34	266	7,832
Electric Gen. (Point)...	211,700	67,795	324
Coal..................	191,134	59,793	243
Oil	20,566	7,093	81
Natural Gas...........	0	909	0
Other.................	0	0	0
Industrial - Point......	20,835	10,810	200
- Area.......	8,064	6,208	171
Coal	17,181	3,831	40
Oil	8,633	3,265	72
Natural Gas...........	65	6,108	97
Other.................	3,020	3,814	162
Comm/Instit - Point.....	3,935	1,677	29
- Area......	6,277	3,139	79
Coal..................	1,115	266	15
Oil	9,093	3,614	50
Natural Gas...........	4	936	43
Other.................	0	0	0
Internal Comb. (Point)....	179	1,059	27
Electric Gen. (Oil)......	171	582	16
Electric Gen. (N. Gas)..	2	414	11
Industrial (Nat. Gas)...	0	0	0
Industrial (Other)......	6	63	0
Commercial/Inst.........	0	0	0
Engine Testing..........	0	0	0
INDUSTRIAL PROCESS (Point)	15,771	10,832	13,049
Chemical Manufacturing....	5,555	719	900
Food/Agriculture..........	7	27	56
Primary Metals............	7,835	5,810	706
Secondary Metals..........	1	9	354
Mineral Products..........	1,790	4,110	111
Petroleum Industry........	0	56	0
Wood Products.............	493	62	21
Organic Solvent Evap......	2	30	8,539
Petroleum Storage/Trans...	0	0	1,974
Other/Not Classified......	88	9	388
SOLID WASTE DISPOSAL - Point	1,037	1,187	93
- Area	348	486	1,408
Residential (Area)........	4	48	323
Other.....................	1,381	1,625	1,178
TRANSPORTATION (Area).......	22,808	166,021	123,097
Gasoline Vehicles.........	5,289	91,787	102,596
Diesel Fuel Vehicles......	7,058	65,870	10,054
Rail......................	659	4,275	1,038
Aircraft..................	225	1,932	2,985
Vessels...................	9,577	2,157	6,424
MISCELLANEOUS AREA..........	13	525	96,888
Forest Fires..............	13	405	1,945
Structural Fires..........	0	114	881
Forest Managed Burning....	0	0	0
Agricultural Burning......	0	6	42
Solvent Evap. Loss........	0	0	72,919
Gasoline Stn. Evap. Loss..	0	0	21,101
ADDITIONAL AREA.............			12,861
TSDFs.....................			518
Petroleum Fugitives.......			0
Bulk Terminals/Plants.....			4,291
Other.....................			8,052
GRAND TOTAL	306,857	279,275	257,288
- POINT	253,457	93,360	13,722
- AREA	53,400	185,915	243,566

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Massachusetts

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	278,311	96,241	2,492
- Area	34,998	29,093	49,635
External Combustion	312,272	122,871	51,987
Residential (Area)	11,730	13,741	49,347
Coal	450	49	165
Oil	11,021	6,907	270
Natural Gas	31	5,131	272
Wood	228	1,654	48,640
Electric Gen. (Point)	251,760	83,581	544
Coal	105,341	45,870	139
Oil	146,405	28,963	372
Natural Gas	14	8,748	33
Other	0	0	0
Industrial - Point	21,841	8,446	1,739
- Area	11,598	7,855	90
Coal	4,896	2,491	10
Oil	28,397	8,411	542
Natural Gas	18	5,319	1,256
Other	128	80	21
Comm/Instit - Point	3,673	1,751	69
- Area	11,670	7,497	198
Coal	1,278	648	42
Oil	14,049	6,404	111
Natural Gas	15	2,193	108
Other	1	3	6
Internal Comb. (Point)	1,037	2,463	140
Electric Gen. (Oil)	534	998	93
Electric Gen. (N. Gas)	1	436	29
Industrial (Nat. Gas)	0	369	10
Industrial (Other)	502	653	8
Commercial/Inst	0	7	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	1,168	510	34,020
Chemical Manufacturing	279	18	1,017
Food/Agriculture	0	0	0
Primary Metals	0	0	0
Secondary Metals	5	0	2
Mineral Products	512	363	212
Petroleum Industry	0	0	24
Wood Products	347	0	1
Organic Solvent Evap	1	1	26,290
Petroleum Storage/Trans	0	0	5,637
Other/Not Classified	24	128	837
SOLID WASTE DISPOSAL - Point	1,981	1,635	808
- Area	304	1,234	15,124
Residential (Area)	195	1,064	14,869
Other	2,090	1,805	1,063
TRANSPORTATION (Area)	11,582	148,139	130,263
Gasoline Vehicles	5,921	107,541	112,583
Diesel Fuel Vehicles	3,468	26,769	4,192
Rail	1,363	8,850	2,149
Aircraft	342	3,106	2,975
Vessels	488	1,873	8,364
MISCELLANEOUS AREA	0	161	172,302
Forest Fires	0	0	0
Structural Fires	0	161	1,273
Forest Managed Burning	0	0	0
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	148,673
Gasoline Stn. Evap. Loss	0	0	22,356
ADDITIONAL AREA			13,859
TSDFs			849
Petroleum Fugitives			0
Bulk Terminals/Plants			5,900
Other			7,110
GRAND TOTAL	328,344	277,013	418,503
- POINT	281,460	98,386	37,320
- AREA	46,884	178,627	381,183

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Michigan

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	470,426	304,517	3,773
- Area	10,558	62,166	109,372
External Combustion	480,930	355,319	111,181
Residential (Area)	4,594	24,866	108,324
Coal	4	0	2
Oil	3,989	2,499	94
Natural Gas	103	18,717	990
Wood	498	3,650	107,238
Electric Gen. (Point)	413,039	252,041	986
Coal	412,140	248,537	969
Oil	894	873	10
Natural Gas	5	2,631	7
Other	0	0	0
Industrial - Point	51,405	36,976	795
- Area	2,988	27,943	629
Coal	43,086	24,927	255
Oil	8,519	6,395	49
Natural Gas	2,132	32,063	620
Other	656	1,534	500
Comm/Instit - Point	5,928	4,136	28
- Area	2,976	9,357	419
Coal	5,774	2,784	22
Oil	3,090	1,778	15
Natural Gas	40	8,930	407
Other	0	1	3
Internal Comb. (Point)	54	11,364	1,964
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	247	9
Industrial (Nat. Gas)	0	10,050	445
Industrial (Other)	0	0	0
Commercial/Inst	0	27	0
Engine Testing	54	1,040	1,510
INDUSTRIAL PROCESS (Point)	48,314	12,159	89,929
Chemical Manufacturing	4,503	0	1,944
Food/Agriculture	484	0	0
Primary Metals	4,619	738	4,613
Secondary Metals	1,276	536	4,154
Mineral Products	14,232	7,686	41
Petroleum Industry	4,734	1,005	2,586
Wood Products	381	716	3,829
Organic Solvent Evap	28	34	66,706
Petroleum Storage/Trans	0	0	5,694
Other/Not Classified	18,057	1,444	362
SOLID WASTE DISPOSAL - Point	357	631	605
- Area	741	3,191	32,068
Residential (Area)	453	2,734	31,312
Other	645	1,088	1,361
TRANSPORTATION (Area)	20,109	274,286	265,421
Gasoline Vehicles	10,437	195,433	225,138
Diesel Fuel Vehicles	7,829	66,288	8,957
Rail	1,215	7,919	1,923
Aircraft	333	3,076	3,553
Vessels	295	1,570	25,850
MISCELLANEOUS AREA	0	168	247,962
Forest Fires	0	5	43
Structural Fires	0	143	1,135
Forest Managed Burning	0	20	77
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	209,088
Gasoline Stn. Evap. Loss	0	0	37,619
ADDITIONAL AREA			39,713
TSDFs			0
Petroleum Fugitives			5,909
Bulk Terminals/Plants			11,101
Other			22,703
GRAND TOTAL	550,505	657,118	788,843
- POINT	519,097	317,307	94,307
- AREA	31,408	339,811	694,536

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Minnesota

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point.....	136,715	143,896	1,196
- Area......	6,295	19,896	75,927
External Combustion.......	143,000	160,486	77,018
Residential (Area).......	2,813	10,343	75,640
Coal..................	0	0	0
Oil	2,433	1,525	44
Natural Gas...........	25	6,258	328
Wood..................	355	2,560	75,268
Electric Gen. (Point)...	117,388	126,020	412
Coal..................	101,943	123,972	407
Oil	26	13	0
Natural Gas...........	0	436	0
Other.................	15,419	1,599	5
Industrial - Point......	15,791	11,935	667
- Area.......	547	4,397	94
Coal	11,898	6,579	32
Oil	4,339	1,353	14
Natural Gas...........	3	6,618	84
Other.................	98	1,782	631
Comm/Instit - Point.....	3,526	2,635	12
- Area......	2,935	5,156	193
Coal..................	3,278	2,096	7
Oil	3,165	1,582	12
Natural Gas...........	18	4,113	186
Other.................	0	0	0
Internal Comb. (Point)....	10	3,306	105
Electric Gen. (Oil).....	1	4	0
Electric Gen. (N. Gas)..	0	20	0
Industrial (Nat. Gas)...	0	3,186	77
Industrial (Other)......	3	73	8
Commercial/Inst.........	0	17	0
Engine Testing..........	6	6	20
INDUSTRIAL PROCESS (Point)	17,904	10,357	47,969
Chemical Manufacturing....	2,305	532	296
Food/Agriculture..........	725	139	977
Primary Metals............	1,734	1,583	80
Secondary Metals..........	518	9	18
Mineral Products..........	681	987	694
Petroleum Industry........	7,007	2,518	4,675
Wood Products.............	591	925	369
Organic Solvent Evap......	1	13	33,118
Petroleum Storage/Trans...	0	0	7,625
Other/Not Classified......	4,342	3,651	117
SOLID WASTE DISPOSAL - Point	59	232	123
- Area	243	1,487	14,760
Residential (Area)........	228	1,461	14,679
Other.....................	74	258	204
TRANSPORTATION (Area).......	13,567	179,906	156,739
Gasoline Vehicles.........	5,266	107,613	127,816
Diesel Fuel Vehicles......	6,753	62,381	8,910
Rail......................	1,056	6,848	1,662
Aircraft..................	173	1,685	1,904
Vessels...................	319	1,379	16,447
MISCELLANEOUS AREA..........	0	121	103,535
Forest Fires..............	0	23	109
Structural Fires..........	0	98	855
Forest Managed Burning....	0	0	0
Agricultural Burning......	0	0	0
Solvent Evap. Loss........	0	0	84,631
Gasoline Stn. Evap. Loss..	0	0	17,940
ADDITIONAL AREA.............			30,328
TSDFs.....................			126
Petroleum Fugitives.......			11,773
Bulk Terminals/Plants.....			11,279
Other.....................			7,150
GRAND TOTAL	174,783	355,895	430,577
- POINT	154,678	154,485	49,288
- AREA	20,105	201,410	381,289

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Mississippi

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point.....	110,210	61,243	5,432
- Area......	3,932	33,246	34,519
External Combustion.......	114,137	84,067	36,686
Residential (Area)......	305	3,065	33,785
Coal...................	0	0	0
Oil	148	106	0
Natural Gas...........	2	1,810	96
Wood..................	155	1,149	33,689
Electric Gen. (Point)...	102,787	40,510	157
Coal..................	102,082	29,535	117
Oil	611	99	1
Natural Gas...........	14	10,377	33
Other.................	80	499	6
Industrial - Point......	7,354	9,682	1,806
- Area.......	2,509	28,675	695
Coal	4,191	1,893	10
Oil	4,845	2,246	60
Natural Gas...........	52	30,603	685
Other.................	775	3,615	1,746
Comm/Instit - Point.....	64	629	204
- Area......	1,118	1,506	39
Coal..................	0	0	0
Oil	1,117	660	3
Natural Gas...........	1	846	36
Other.................	64	629	204
Internal Comb. (Point)....	5	10,422	3,265
Electric Gen. (Oil).....	0	0	0
Electric Gen. (N. Gas)..	2	719	22
Industrial (Nat. Gas)...	3	9,703	3,243
Industrial (Other)......	0	0	0
Commercial/Inst.........	0	0	0
Engine Testing..........	0	0	0
INDUSTRIAL PROCESS (Point)	48,683	13,273	30,781
Chemical Manufacturing....	19,996	7,409	207
Food/Agriculture..........	0	0	3,055
Primary Metals............	0	0	0
Secondary Metals..........	0	0	0
Mineral Products..........	3,706	733	174
Petroleum Industry........	13,917	3,104	1,236
Wood Products.............	8,155	2,027	391
Organic Solvent Evap......	1	0	8,245
Petroleum Storage/Trans...	0	0	12,869
Other/Not Classified......	2,908	0	4,604
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	199	1,413	11,015
Residential (Area)........	199	1,375	10,883
Other.....................	0	38	132
TRANSPORTATION (Area).......	11,541	127,441	88,256
Gasoline Vehicles.........	2,964	59,109	67,915
Diesel Fuel Vehicles......	6,195	59,000	8,350
Rail......................	630	4,089	992
Aircraft..................	161	1,380	2,957
Vessels...................	1,591	3,863	8,042
MISCELLANEOUS AREA..........	56	2,206	68,299
Forest Fires..............	0	8	53
Structural Fires..........	0	66	569
Forest Managed Burning....	56	1,585	5,676
Agricultural Burning......	0	547	3,559
Solvent Evap. Loss........	0	0	47,470
Gasoline Stn. Evap. Loss..	0	0	10,972
ADDITIONAL AREA.............			36,770
TSDFs.....................			3,198
Petroleum Fugitives.......			19,259
Bulk Terminals/Plants.....			7,757
Other.....................			6,556
GRAND TOTAL	174,621	238,822	275,072
- POINT	158,893	74,516	36,213
- AREA	15,728	164,306	238,859

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Missouri

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	987,000	262,172	939
- Area	34,203	28,284	86,823
External Combustion	1,021,174	289,869	87,710
Residential (Area)	2,876	11,261	86,164
Coal	1,856	65	268
Oil	565	363	96
Natural Gas	32	7,750	606
Wood	423	3,083	85,194
Electric Gen. (Point)	964,714	255,554	805
Coal	964,509	254,796	797
Oil	202	90	0
Natural Gas	1	657	3
Other	2	11	5
Industrial - Point	18,165	5,454	67
- Area	28,206	13,120	338
Coal	42,701	8,521	151
Oil	3,636	1,238	46
Natural Gas	7	8,256	170
Other	27	559	38
Comm/Instit - Point	4,092	577	15
- Area	3,121	3,903	321
Coal	5,384	524	13
Oil	1,716	821	114
Natural Gas	112	3,129	203
Other	1	6	6
Internal Comb. (Point)	29	587	52
Electric Gen. (Oil)	2	13	1
Electric Gen. (N. Gas)	0	4	0
Industrial (Nat. Gas)	0	235	6
Industrial (Other)	21	316	30
Commercial/Inst	1	14	2
Engine Testing	5	5	13
INDUSTRIAL PROCESS (Point)	123,379	27,375	82,794
Chemical Manufacturing	2,432	6,262	39,563
Food/Agriculture	8	32	985
Primary Metals	70,975	1,597	259
Secondary Metals	1	25	98
Mineral Products	33,535	16,406	158
Petroleum Industry	0	27	362
Wood Products	0	0	0
Organic Solvent Evap	1	41	39,644
Petroleum Storage/Trans	0	0	1,365
Other/Not Classified	16,427	2,985	360
SOLID WASTE DISPOSAL - Point	151	215	204
- Area	312	1,755	20,058
Residential (Area)	281	1,693	19,889
Other	182	277	373
TRANSPORTATION (Area)	16,999	213,594	163,670
Gasoline Vehicles	6,492	125,906	134,218
Diesel Fuel Vehicles	8,200	71,409	10,272
Rail	1,346	8,744	2,115
Aircraft	333	3,185	3,160
Vessels	628	4,350	13,905
MISCELLANEOUS AREA	0	127	127,179
Forest Fires	0	9	80
Structural Fires	0	118	1,041
Forest Managed Burning	0	0	0
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	102,465
Gasoline Stn. Evap. Loss	0	0	23,593
ADDITIONAL AREA			25,815
TSDFs			1,634
Petroleum Fugitives			0
Bulk Terminals/Plants			13,212
Other			10,969
GRAND TOTAL	1,162,044	533,522	507,482
- POINT	1,110,530	289,762	83,937
- AREA	51,514	243,760	423,545

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Montana

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	21,096	30,211	1,334
- Area	4,479	9,089	21,552
External Combustion	25,469	37,056	22,741
Residential (Area)	423	1,994	21,391
Coal	7	4	17
Oil	317	129	3
Natural Gas	4	1,138	53
Wood	95	723	21,318
Electric Gen. (Point)	16,339	25,608	313
Coal	16,326	25,366	192
Oil	0	0	0
Natural Gas	0	0	0
Other	13	242	121
Industrial - Point	4,651	2,359	876
- Area	685	5,265	114
Coal	898	911	6
Oil	3,896	530	6
Natural Gas	1	5,275	110
Other	541	908	868
Comm/Instit - Point	0	0	0
- Area	3,371	1,830	47
Coal	6	15	0
Oil	3,362	1,064	13
Natural Gas	3	751	34
Other	0	0	0
Internal Comb. (Point)	106	2,244	145
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	433	10
Industrial (Other)	106	1,811	135
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	56,669	9,638	6,259
Chemical Manufacturing	3,539	2	32
Food/Agriculture	145	25	67
Primary Metals	27,972	209	90
Secondary Metals	0	0	0
Mineral Products	205	1,743	0
Petroleum Industry	17,759	5,358	2,929
Wood Products	418	1,489	635
Organic Solvent Evap	0	0	0
Petroleum Storage/Trans	0	0	2,492
Other/Not Classified	6,631	812	14
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	59	387	3,954
Residential (Area)	59	374	3,911
Other	0	13	43
TRANSPORTATION (Area)	8,246	90,960	48,525
Gasoline Vehicles	1,051	22,250	34,489
Diesel Fuel Vehicles	5,072	54,723	8,768
Rail	2,059	13,368	3,245
Aircraft	59	570	861
Vessels	5	49	1,162
MISCELLANEOUS AREA	564	15,128	72,185
Forest Fires	140	3,823	18,340
Structural Fires	0	11	153
Forest Managed Burning	424	11,294	40,372
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	9,447
Gasoline Stn. Evap. Loss	0	0	3,873
ADDITIONAL AREA			12,456
TSDFs			99
Petroleum Fugitives			6,912
Bulk Terminals/Plants			3,405
Other			2,040
GRAND TOTAL	91,113	155,413	166,265
- POINT	77,765	39,849	7,593
- AREA	13,348	115,564	158,672

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Nebraska

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	48,546	39,161	325
- Area	1,584	10,666	5,058
External Combustion	50,130	47,328	5,327
Residential (Area)	269	3,036	4,809
Coal	25	2	23
Oil	230	150	3
Natural Gas	9	2,728	173
Wood	5	156	4,610
Electric Gen. (Point)	47,092	35,025	265
Coal	47,081	34,940	265
Oil	11	5	0
Natural Gas	0	80	0
Other	0	0	0
Industrial - Point	1,356	1,389	4
- Area	760	5,310	139
Coal	1,640	986	40
Oil	472	208	7
Natural Gas	4	5,505	96
Other	0	0	0
Comm/Instit - Point	98	248	0
- Area	555	2,320	110
Coal	59	37	0
Oil	587	398	18
Natural Gas	7	2,133	92
Other	0	0	0
Internal Comb. (Point)	0	2,499	56
Electric Gen. (Oil)	0	62	2
Electric Gen. (N. Gas)	0	321	4
Industrial (Nat. Gas)	0	2,116	50
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	4,660	1,022	3,782
Chemical Manufacturing	0	0	0
Food/Agriculture	70	10	34
Primary Metals	0	0	0
Secondary Metals	0	0	0
Mineral Products	3,970	1,012	8
Petroleum Industry	0	0	0
Wood Products	0	0	0
Organic Solvent Evap	0	0	2,187
Petroleum Storage/Trans	0	0	1,553
Other/Not Classified	620	0	0
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	112	682	7,114
Residential (Area)	112	682	7,114
Other	0	0	0
TRANSPORTATION (Area)	10,350	113,640	63,721
Gasoline Vehicles	1,873	40,186	48,086
Diesel Fuel Vehicles	5,465	53,609	7,976
Rail	2,928	18,998	4,611
Aircraft	74	759	1,095
Vessels	10	88	1,953
MISCELLANEOUS AREA	0	120	32,892
Forest Fires	0	91	369
Structural Fires	0	29	329
Forest Managed Burning	0	0	0
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	25,546
Gasoline Stn. Evap. Loss	0	0	6,648
ADDITIONAL AREA			7,634
TSDFs			174
Petroleum Fugitives			0
Bulk Terminals/Plants			4,936
Other			2,524
GRAND TOTAL	65,252	165,291	120,526
- POINT	53,206	40,183	4,107
- AREA	12,046	125,108	116,419

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Nevada

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	32,745	61,190	339
- Area	1,820	3,572	6,762
External Combustion	34,565	64,762	7,101
Residential (Area)	335	1,152	6,697
Coal	0	0	0
Oil	301	126	3
Natural Gas	4	800	41
Wood	30	226	6,653
Electric Gen. (Point)	32,745	61,190	339
Coal	32,742	60,062	336
Oil	0	0	0
Natural Gas	3	1,128	3
Other	0	0	0
Industrial - Point	0	0	0
- Area	1,075	1,617	31
Coal	165	405	2
Oil	908	613	18
Natural Gas	2	599	11
Other	0	0	0
Comm/Instit - Point	0	0	0
- Area	410	803	34
Coal	8	12	0
Oil	398	174	2
Natural Gas	4	617	32
Other	0	0	0
Internal Comb. (Point)	0	0	0
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	0	0
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	1,471	1,237	242
Chemical Manufacturing	0	0	0
Food/Agriculture	0	0	0
Primary Metals	0	136	0
Secondary Metals	0	0	0
Mineral Products	1,410	1,101	29
Petroleum Industry	0	0	0
Wood Products	0	0	0
Organic Solvent Evap	0	0	0
Petroleum Storage/Trans	0	0	213
Other/Not Classified	61	0	0
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	22	120	2,013
Residential (Area)	22	119	2,012
Other	0	1	1
TRANSPORTATION (Area)	4,176	46,359	41,134
Gasoline Vehicles	1,225	23,002	32,937
Diesel Fuel Vehicles	1,585	14,012	2,433
Rail	1,150	7,475	1,814
Aircraft	205	1,804	2,468
Vessels	11	66	1,482
MISCELLANEOUS AREA	6	194	19,219
Forest Fires	0	13	63
Structural Fires	0	11	109
Forest Managed Burning	6	166	596
Agricultural Burning	0	4	28
Solvent Evap. Loss	0	0	13,741
Gasoline Stn. Evap. Loss	0	0	4,682
ADDITIONAL AREA			6,537
TSDFs			3,058
Petroleum Fugitives			238
Bulk Terminals/Plants			1,410
Other			1,831
GRAND TOTAL	40,240	112,672	76,246
- POINT	34,216	62,427	581
- AREA	6,024	50,245	75,665

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

New Hampshire

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	80,271	23,732	975
- Area	2,870	4,049	19,408
External Combustion	83,140	27,775	20,383
Residential (Area)	2,302	2,463	19,370
Coal	17	0	7
Oil	2,194	1,373	53
Natural Gas	1	434	23
Wood	90	656	19,287
Electric Gen. (Point)	74,193	21,747	409
Coal	60,411	19,051	357
Oil	13,772	2,579	49
Natural Gas	0	0	0
Other	10	117	3
Industrial - Point	5,160	1,694	507
- Area	105	1,052	23
Coal	22	63	0
Oil	5,216	1,087	16
Natural Gas	0	1,005	22
Other	27	591	492
Comm/Instit - Point	917	285	59
- Area	463	534	15
Coal	96	35	0
Oil	1,279	460	3
Natural Gas	1	249	13
Other	4	75	58
Internal Comb. (Point)	1	6	0
Electric Gen. (Oil)	1	0	0
Electric Gen. (N. Gas)	0	2	0
Industrial (Nat. Gas)	0	0	0
Industrial (Other)	0	4	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	125	223	3,372
Chemical Manufacturing	6	11	120
Food/Agriculture	24	13	0
Primary Metals	0	0	0
Secondary Metals	0	0	0
Mineral Products	90	19	0
Petroleum Industry	0	0	0
Wood Products	0	178	0
Organic Solvent Evap	0	0	2,359
Petroleum Storage/Trans	0	0	99
Other/Not Classified	5	2	794
SOLID WASTE DISPOSAL - Point	8	57	0
- Area	86	409	3,186
Residential (Area)	59	366	3,125
Other	35	100	61
TRANSPORTATION (Area)	1,923	26,126	23,764
Gasoline Vehicles	1,157	19,716	21,900
Diesel Fuel Vehicles	710	5,948	912
Rail	10	63	13
Aircraft	42	366	565
Vessels	4	33	374
MISCELLANEOUS AREA	0	21	30,872
Forest Fires	0	0	0
Structural Fires	0	21	165
Forest Managed Burning	0	0	0
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	26,499
Gasoline Stn. Evap. Loss	0	0	4,208
ADDITIONAL AREA			3,808
TSDFs			9
Petroleum Fugitives			0
Bulk Terminals/Plants			1,761
Other			2,038
GRAND TOTAL	85,283	54,617	85,385
- POINT	80,404	24,012	4,347
- AREA	4,879	30,605	81,038

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

New Jersey

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point.....	117,806	95,719	1,095
- Area......	21,407	33,101	55,730
External Combustion........	111,185	111,771	56,374
Residential (Area).......	11,621	16,645	55,338
Coal..................	151	25	88
Oil	11,168	7,000	271
Natural Gas...........	47	7,766	409
Wood..................	255	1,854	54,570
Electric Gen. (Point)...	77,199	63,588	397
Coal..................	67,024	36,069	223
Oil	10,175	27,518	174
Natural Gas...........	0	1	0
Other.................	0	0	0
Industrial - Point......	11,460	14,085	246
- Area.......	889	6,863	94
Coal	519	4,018	14
Oil	10,563	11,579	55
Natural Gas...........	968	5,143	87
Other.................	299	208	184
Comm/Instit - Point.....	1,119	997	1
- Area......	8,897	9,593	298
Coal..................	2,314	858	3
Oil	7,679	5,553	75
Natural Gas...........	23	4,179	221
Other.................	0	0	0
Internal Comb. (Point)....	28,028	17,049	451
Electric Gen. (Oil).....	511	1,578	144
Electric Gen. (N. Gas)..	52	890	62
Industrial (Nat. Gas)...	25,835	11,290	182
Industrial (Other)......	30	713	63
Commercial/Inst.........	1,600	2,562	0
Engine Testing..........	0	16	0
INDUSTRIAL PROCESS (Point)	14,556	17,939	40,891
Chemical Manufacturing....	5,673	10,381	7,375
Food/Agriculture..........	3	936	30
Primary Metals............	0	1,849	18
Secondary Metals..........	315	163	491
Mineral Products..........	1,563	2,511	53
Petroleum Industry........	6,857	1,633	2,346
Wood Products.............	22	16	357
Organic Solvent Evap......	0	6	13,642
Petroleum Storage/Trans...	11	15	15,428
Other/Not Classified......	112	429	1,151
SOLID WASTE DISPOSAL - Point	540	460	4
- Area	1,467	2,881	9,845
Residential (Area)........	140	894	7,383
Other.....................	1,867	2,447	2,466
TRANSPORTATION (Area).......	27,669	218,615	182,379
Gasoline Vehicles.........	8,270	148,813	160,755
Diesel Fuel Vehicles......	6,580	51,389	8,428
Rail......................	1,404	9,122	2,215
Aircraft..................	291	2,629	2,984
Vessels...................	11,124	6,662	7,997
MISCELLANEOUS AREA..........	3	309	206,708
Forest Fires..............	0	0	0
Structural Fires..........	0	203	1,612
Forest Managed Burning....	3	106	376
Agricultural Burning......	0	0	0
Solvent Evap. Loss........	0	0	174,163
Gasoline Stn. Evap. Loss..	0	0	30,557
ADDITIONAL AREA.............			88,920
TSDFs.....................			36,827
Petroleum Fugitives.......			15,370
Bulk Terminals/Plants.....			7,610
Other.....................			29,112
GRAND TOTAL	183,448	369,024	585,572
- POINT	132,902	114,118	41,990
- AREA	50,546	254,906	543,582

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

New Mexico

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	79,244	179,873	17,526
- Area	16,039	28,549	25,884
External Combustion	94,561	138,556	28,933
Residential (Area)	487	2,661	25,273
Coal	0	0	0
Oil	362	155	4
Natural Gas	6	1,648	86
Wood	119	858	25,183
Electric Gen. (Point)	77,930	108,020	696
Coal	77,852	102,896	564
Oil	32	52	1
Natural Gas	42	4,902	90
Other	4	170	41
Industrial - Point	306	1,846	2,323
- Area	14,507	24,623	569
Coal	0	0	0
Oil	14,580	5,343	90
Natural Gas	23	20,381	497
Other	210	745	2,305
Comm/Instit - Point	286	141	30
- Area	1,045	1,265	42
Coal	285	131	29
Oil	1,043	474	5
Natural Gas	3	801	38
Other	0	0	0
Internal Comb. (Point)	722	69,866	14,477
Electric Gen. (Oil)	406	1,034	1
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	316	68,832	14,476
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	170,369	4,236	3,483
Chemical Manufacturing	14,069	1,468	16
Food/Agriculture	0	0	0
Primary Metals	106,482	0	0
Secondary Metals	0	0	79
Mineral Products	306	0	0
Petroleum Industry	49,504	2,376	243
Wood Products	0	0	0
Organic Solvent Evap	0	0	0
Petroleum Storage/Trans	0	0	3,145
Other/Not Classified	8	392	0
SOLID WASTE DISPOSAL - Point	7	50	539
- Area	64	376	2,634
Residential (Area)	47	332	2,466
Other	24	94	707
TRANSPORTATION (Area)	5,662	70,523	79,016
Gasoline Vehicles	2,072	40,325	69,742
Diesel Fuel Vehicles	3,320	28,111	5,867
Rail	112	743	176
Aircraft	151	1,296	2,185
Vessels	7	48	1,046
MISCELLANEOUS AREA	43	1,240	28,464
Forest Fires	12	396	1,896
Structural Fires	0	30	265
Forest Managed Burning	31	814	2,911
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	16,248
Gasoline Stn. Evap. Loss	0	0	7,144
ADDITIONAL AREA			14,203
TSDFs			753
Petroleum Fugitives			3,842
Bulk Terminals/Plants			4,751
Other			4,857
GRAND TOTAL	271,428	284,847	171,749
- POINT	249,620	184,159	21,548
- AREA	21,808	100,688	150,201

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

New York

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	538,132	166,716	9,370
- Area	66,254	72,569	147,586
External Combustion	604,386	239,285	156,956
Residential (Area)	22,029	34,122	146,653
Coal	1,639	122	460
Oil	19,615	12,293	480
Natural Gas	98	16,779	886
Wood	677	4,928	144,827
Electric Gen. (Point)	409,630	118,105	1,989
Coal	219,757	56,761	922
Oil	189,811	39,926	961
Natural Gas	62	21,418	106
Other	0	0	0
Industrial - Point	107,290	35,233	6,893
- Area	8,519	14,191	262
Coal	67,075	20,025	297
Oil	46,079	12,934	3,927
Natural Gas	1,017	13,890	2,334
Other	1,638	2,575	597
Comm/Instit - Point	21,212	13,378	488
- Area	35,706	24,256	671
Coal	9,599	2,556	45
Oil	47,048	24,011	671
Natural Gas	263	10,965	415
Other	8	102	28
Internal Comb. (Point)	0	0	0
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	0	0
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	31,020	14,507	42,599
Chemical Manufacturing	728	19	4,205
Food/Agriculture	0	0	0
Primary Metals	4,637	1,590	33
Secondary Metals	6	3	310
Mineral Products	0	0	43
Petroleum Industry	0	0	0
Wood Products	34	0	0
Organic Solvent Evap	0	0	6,810
Petroleum Storage/Trans	0	0	4,346
Other/Not Classified	25,615	12,895	26,852
SOLID WASTE DISPOSAL - Point	2,217	2,643	1,107
- Area	985	3,818	23,256
Residential (Area)	441	2,913	21,653
Other	2,761	3,548	2,710
TRANSPORTATION (Area)	26,601	365,886	330,606
Gasoline Vehicles	14,892	278,593	297,785
Diesel Fuel Vehicles	9,103	72,859	10,861
Rail	1,125	7,314	1,775
Aircraft	644	5,927	5,834
Vessels	837	1,193	14,351
MISCELLANEOUS AREA	0	505	388,962
Forest Fires	0	0	0
Structural Fires	0	505	4,026
Forest Managed Burning	0	0	0
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	329,652
Gasoline Stn. Evap. Loss	0	0	55,284
ADDITIONAL AREA	0	0	44,051
TSDFs	0	0	4,837
Petroleum Fugitives	0	0	0
Bulk Terminals/Plants	0	0	15,258
Other	0	0	23,956
GRAND TOTAL	665,209	626,644	987,537
- POINT	571,369	183,866	53,076
- AREA	93,840	442,778	934,461

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

North Carolina

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point.....	419,290	223,184	2,369
- Area......	30,113	30,249	130,602
External Combustion.......	449,398	253,405	132,971
Residential (Area).......	5,950	9,264	130,197
Coal.................	1,297	122	416
Oil	4,037	2,520	93
Natural Gas...........	6	2,214	111
Wood.................	610	4,408	129,577
Electric Gen. (Point)...	350,262	194,057	941
Coal.................	349,411	193,797	937
Oil	848	239	1
Natural Gas...........	0	0	0
Other.................	3	21	3
Industrial - Point......	64,091	27,427	1,409
- Area.......	21,325	18,447	348
Coal	42,794	22,186	69
Oil	34,994	7,921	33
Natural Gas...........	12	11,599	251
Other.................	7,616	4,168	1,404
Comm/Instit - Point.....	4,932	1,672	19
- Area......	2,838	2,538	57
Coal.................	2,297	853	7
Oil	5,407	1,940	12
Natural Gas...........	6	1,402	52
Other.................	60	15	5
Internal Comb. (Point)....	5	28	0
Electric Gen. (Oil).....	5	28	0
Electric Gen. (N. Gas)..	0	0	0
Industrial (Nat. Gas)...	0	0	0
Industrial (Other)......	0	0	0
Commercial/Inst.........	0	0	0
Engine Testing..........	0	0	0
INDUSTRIAL PROCESS (Point)	15,051	10,018	71,055
Chemical Manufacturing....	5,771	478	20,912
Food/Agriculture..........	64	18	947
Primary Metals............	131	0	56
Secondary Metals..........	23	27	156
Mineral Products..........	601	1,729	87
Petroleum Industry........	0	0	0
Wood Products.............	8,348	7,722	3,332
Organic Solvent Evap......	0	11	38,424
Petroleum Storage/Trans...	0	0	4,391
Other/Not Classified......	113	33	2,750
SOLID WASTE DISPOSAL - Point	116	102	667
- Area	616	3,388	17,585
Residential (Area)........	439	3,043	16,720
Other.....................	293	447	1,532
TRANSPORTATION (Area).......	17,944	231,574	206,217
Gasoline Vehicles.........	7,756	149,983	176,124
Diesel Fuel Vehicles......	8,257	68,555	10,137
Rail......................	1,160	7,498	1,822
Aircraft..................	437	3,849	5,902
Vessels...................	334	1,689	12,232
MISCELLANEOUS AREA..........	41	2,021	182,472
Forest Fires..............	1	186	917
Structural Fires..........	0	144	1,140
Forest Managed Burning....	40	1,106	3,937
Agricultural Burning......	0	585	3,812
Solvent Evap. Loss........	0	0	144,113
Gasoline Stn. Evap. Loss..	0	0	28,553
ADDITIONAL AREA............			67,634
TSDFs.....................			7,417
Petroleum Fugitives.......			0
Bulk Terminals/Plants.....			18,462
Other.....................			41,755
GRAND TOTAL	483,171	500,536	678,601
- POINT	434,457	233,304	74,091
- AREA	48,714	267,232	604,510

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

North Dakota

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	170,521	114,743	2,468
- Area	16,047	12,320	2,146
External Combustion	186,562	121,941	3,700
Residential (Area)	1,375	1,135	2,007
Coal	689	56	217
Oil	680	429	10
Natural Gas	2	596	30
Wood	4	54	1,750
Electric Gen. (Point)	144,899	104,713	1,154
Coal	144,867	104,700	1,154
Oil	32	13	0
Natural Gas	0	0	0
Other	0	0	0
Industrial - Point	24,685	4,244	187
- Area	13,483	10,189	111
Coal	13,727	7,190	130
Oil	3,898	1,084	10
Natural Gas	0	3,570	85
Other	20,543	2,589	73
Comm/Instit - Point	931	664	213
- Area	1,189	996	28
Coal	1,297	602	215
Oil	716	321	1
Natural Gas	2	520	22
Other	105	217	3
Internal Comb. (Point)	6	5,122	914
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	373	151
Industrial (Nat. Gas)	6	4,749	763
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	29,855	1,134	402
Chemical Manufacturing	27,600	222	337
Food/Agriculture	811	396	3
Primary Metals	0	0	0
Secondary Metals	0	0	0
Mineral Products	0	0	0
Petroleum Industry	1,444	516	62
Wood Products	0	0	0
Organic Solvent Evap	0	0	0
Petroleum Storage/Trans	0	0	0
Other/Not Classified	0	0	0
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	76	428	3,881
Residential (Area)	61	402	3,838
Other	15	26	43
TRANSPORTATION (Area)	4,753	54,517	29,627
Gasoline Vehicles	886	18,901	21,736
Diesel Fuel Vehicles	2,882	29,056	4,220
Rail	919	5,950	1,445
Aircraft	61	556	1,007
Vessels	5	54	1,219
MISCELLANEOUS AREA	0	39	10,804
Forest Fires	0	5	33
Structural Fires	0	12	139
Forest Managed Burning	0	22	78
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	7,405
Gasoline Stn. Evap. Loss	0	0	3,149
ADDITIONAL AREA			11,484
TSDFs			401
Petroleum Fugitives			3,074
Bulk Terminals/Plants			5,225
Other			2,734
GRAND TOTAL	221,252	183,181	60,812
- POINT	200,376	115,877	2,870
- AREA	20,876	67,304	57,942

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Ohio

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	2,399,748	553,068	3,419
- Area	66,321	65,677	126,429
External Combustion	2,465,991	607,654	129,481
Residential (Area)	7,956	23,998	125,486
Coal	3,719	155	520
Oil	3,563	2,231	93
Natural Gas	98	17,393	919
Wood	576	4,219	123,954
Electric Gen. (Point)	2,241,531	494,387	1,649
Coal	2,240,629	493,621	1,619
Oil	902	361	23
Natural Gas	0	77	1
Other	0	328	6
Industrial - Point	137,428	43,647	1,006
- Area	52,793	32,788	551
Coal	180,035	42,457	427
Oil	8,030	4,297	109
Natural Gas	66	24,108	532
Other	2,090	5,573	489
Comm/Instit - Point	20,711	3,943	397
- Area	5,572	8,891	392
Coal	24,278	4,037	132
Oil	1,971	1,312	18
Natural Gas	33	7,360	375
Other	1	125	264
Internal Comb. (Point)	78	11,091	367
Electric Gen. (Oil)	35	39	14
Electric Gen. (N. Gas)	0	2	2
Industrial (Nat. Gas)	23	7,142	168
Industrial (Other)	0	0	0
Commercial/Inst	20	3,908	183
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	57,295	20,475	91,196
Chemical Manufacturing	4,378	2,653	21,112
Food/Agriculture	13	0	408
Primary Metals	15,810	2,610	2,389
Secondary Metals	2,798	154	405
Mineral Products	9,854	9,262	850
Petroleum Industry	12,967	5,005	1,550
Wood Products	443	0	104
Organic Solvent Evap	0	0	60,510
Petroleum Storage/Trans	0	0	2,651
Other/Not Classified	11,032	791	1,217
SOLID WASTE DISPOSAL - Point	492	996	334
- Area	969	3,933	38,562
Residential (Area)	516	3,095	36,718
Other	945	1,834	2,178
TRANSPORTATION (Area)	32,696	371,828	314,488
Gasoline Vehicles	12,033	233,253	278,027
Diesel Fuel Vehicles	13,603	115,546	16,211
Rail	3,007	19,489	4,728
Aircraft	306	2,803	3,588
Vessels	3,747	737	11,934
MISCELLANEOUS AREA	0	322	303,034
Forest Fires	0	14	76
Structural Fires	0	308	2,390
Forest Managed Burning	0	0	0
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	256,545
Gasoline Stn. Evap. Loss	0	0	44,023
ADDITIONAL AREA			148,347
TSDFs			85,126
Petroleum Fugitives			27,597
Bulk Terminals/Plants			12,147
Other			23,478
GRAND TOTAL	2,557,521	1,016,299	1,025,809
- POINT	2,457,535	574,539	94,949
- AREA	99,986	441,760	930,860

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Oklahoma

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	89,353	134,073	10,137
- Area	18,142	76,597	39,996
External Combustion	107,455	160,231	41,698
Residential (Area)	339	5,910	38,263
Coal	70	0	6
Oil	77	36	0
Natural Gas	18	4,583	243
Wood	174	1,291	38,014
Electric Gen. (Point)	82,142	76,062	1,316
Coal	82,024	47,555	1,169
Oil	75	2,627	0
Natural Gas	43	25,880	147
Other	0	0	0
Industrial - Point	7,171	7,461	385
- Area	17,189	68,293	1,626
Coal	17,874	3,976	15
Oil	3,938	2,807	87
Natural Gas	76	65,834	1,555
Other	2,472	3,137	354
Comm/Instit - Point	0	111	1
- Area	614	2,394	107
Coal	39	4	0
Oil	568	399	4
Natural Gas	7	2,102	104
Other	0	0	0
Internal Comb. (Point)	40	50,439	8,435
Electric Gen. (Oil)	1	16	1
Electric Gen. (N. Gas)	4	4,763	28
Industrial (Nat. Gas)	0	45,601	8,312
Industrial (Other)	0	19	7
Commercial/Inst	0	0	0
Engine Testing	35	40	87
INDUSTRIAL PROCESS (Point)	29,024	21,009	21,650
Chemical Manufacturing	1,716	3,922	4,974
Food/Agriculture	0	47	19
Primary Metals	0	3	0
Secondary Metals	0	32	0
Mineral Products	3,957	7,112	72
Petroleum Industry	20,367	9,116	1,969
Wood Products	2,137	595	256
Organic Solvent Evap	0	4	3,616
Petroleum Storage/Trans	0	0	9,130
Other/Not Classified	847	178	1,614
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	134	906	6,341
Residential (Area)	134	906	6,341
Other	0	0	0
TRANSPORTATION (Area)	13,473	163,506	127,162
Gasoline Vehicles	4,534	88,715	104,583
Diesel Fuel Vehicles	7,078	62,299	8,322
Rail	1,592	10,329	2,507
Aircraft	201	1,770	3,080
Vessels	68	393	8,670
MISCELLANEOUS AREA	10	333	68,588
Forest Fires	0	1	19
Structural Fires	0	53	479
Forest Managed Burning	10	279	1,001
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	50,326
Gasoline Stn. Evap. Loss	0	0	16,763
ADDITIONAL AREA	0	0	83,932
TSDFs	0	0	26,289
Petroleum Fugitives	0	0	20,314
Bulk Terminals/Plants	0	0	9,081
Other	0	0	28,248
GRAND TOTAL	150,136	396,424	357,806
- POINT	118,377	155,082	31,787
- AREA	31,759	241,342	326,019

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Oregon

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	5,510	8,291	2,023
- Area	16,588	16,008	92,675
External Combustion	22,098	24,299	94,698
Residential (Area)	4,066	5,263	92,343
Coal	11	1	8
Oil	3,619	909	31
Natural Gas	5	1,214	62
Wood	431	3,139	92,242
Electric Gen. (Point)	2,491	1,646	85
Coal	2,483	1,506	15
Oil	0	0	0
Natural Gas	0	0	0
Other	8	140	70
Industrial - Point	2,752	6,552	1,868
- Area	10,373	9,189	278
Coal	1,295	1,136	3
Oil	3,427	1,127	21
Natural Gas	9	9,801	185
Other	8,394	3,677	1,937
Comm/Instit - Point	267	93	70
- Area	2,149	1,556	54
Coal	8	4	0
Oil	2,397	652	7
Natural Gas	4	959	48
Other	7	34	69
Internal Comb. (Point)	0	0	0
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	0	0
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	6,675	2,606	10,686
Chemical Manufacturing	0	0	2,554
Food/Agriculture	149	22	73
Primary Metals	1,712	0	97
Secondary Metals	268	1	0
Mineral Products	292	396	14
Petroleum Industry	0	0	0
Wood Products	4,202	2,187	1,316
Organic Solvent Evap	0	0	6,460
Petroleum Storage/Trans	0	0	172
Other/Not Classified	52	0	0
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	143	851	10,371
Residential (Area)	140	825	10,251
Other	3	26	120
TRANSPORTATION (Area)	15,447	135,656	101,738
Gasoline Vehicles	3,417	70,700	82,817
Diesel Fuel Vehicles	4,716	40,552	5,787
Rail	3,178	20,615	5,006
Aircraft	128	1,144	1,529
Vessels	4,008	2,645	6,599
MISCELLANEOUS AREA	243	7,135	85,514
Forest Fires	19	567	2,714
Structural Fires	0	59	466
Forest Managed Burning	224	6,036	21,579
Agricultural Burning	0	473	3,081
Solvent Evap. Loss	0	0	46,040
Gasoline Stn. Evap. Loss	0	0	11,634
ADDITIONAL AREA			21,522
TSDFs			11,806
Petroleum Fugitives			795
Bulk Terminals/Plants			5,425
Other			3,496
GRAND TOTAL	44,606	170,547	324,529
- POINT	12,185	10,897	12,709
- AREA	32,421	159,650	311,820

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Pennsylvania

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	1,273,117	516,965	2,845
- Area	38,680	79,076	166,527
External Combustion	1,311,674	573,929	168,775
Residential (Area)	22,633	27,707	165,210
Coal	7,949	714	2,387
Oil	13,862	8,688	338
Natural Gas	74	12,797	678
Wood	748	5,508	161,807
Electric Gen. (Point)	1,185,422	461,234	1,647
Coal	1,151,171	443,821	1,439
Oil	30,759	16,491	206
Natural Gas	0	191	0
Other	3,492	731	2
Industrial - Point	79,692	31,647	470
- Area	2,073	39,727	945
Coal	63,790	21,166	115
Oil	12,025	5,524	97
Natural Gas	55	41,452	898
Other	5,895	3,232	305
Comm/Instit - Point	7,880	1,972	131
- Area	13,974	11,642	372
Coal	15,587	4,110	125
Oil	6,235	3,489	44
Natural Gas	29	6,010	299
Other	3	5	35
Internal Comb. (Point)	123	22,112	597
Electric Gen. (Oil)	77	492	26
Electric Gen. (N. Gas)	0	5	0
Industrial (Nat. Gas)	5	20,144	504
Industrial (Other)	0	0	0
Commercial/Inst	0	826	20
Engine Testing	41	645	47
INDUSTRIAL PROCESS (Point)	83,256	31,673	72,256
Chemical Manufacturing	1,024	105	4,699
Food/Agriculture	0	0	16
Primary Metals	22,619	2,588	9,337
Secondary Metals	12,442	499	603
Mineral Products	29,566	19,088	1,941
Petroleum Industry	12,963	6,827	6,889
Wood Products	613	752	1,025
Organic Solvent Evap	669	1,739	38,025
Petroleum Storage/Trans	0	0	8,286
Other/Not Classified	3,360	75	1,435
SOLID WASTE DISPOSAL - Point	800	1,175	502
- Area	596	3,763	20,983
Residential (Area)	536	3,677	20,839
Other	860	1,261	646
TRANSPORTATION (Area)	27,581	324,725	269,784
Gasoline Vehicles	11,306	212,242	238,887
Diesel Fuel Vehicles	11,816	94,998	15,018
Rail	1,847	12,021	2,916
Aircraft	450	4,123	4,352
Vessels	2,162	1,341	8,611
MISCELLANEOUS AREA	0	331	281,276
Forest Fires	0	0	0
Structural Fires	0	331	2,649
Forest Managed Burning	0	0	0
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	237,372
Gasoline Stn. Evap. Loss	0	0	41,255
ADDITIONAL AREA			110,876
TSDFs			23,897
Petroleum Fugitives			38,053
Bulk Terminals/Plants			20,019
Other			28,907
GRAND TOTAL	1,424,030	957,708	925,049
- POINT	1,357,173	549,813	75,603
- AREA	66,857	407,895	849,446

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Rhode Island

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	3,713	2,347	25
- Area	3,679	4,241	6,464
External Combustion	7,392	6,588	6,489
Residential (Area)	2,159	2,346	6,428
Coal	20	1	7
Oil	2,105	1,319	51
Natural Gas	4	811	43
Wood	30	215	6,327
Electric Gen. (Point)	2,316	1,645	13
Coal	0	0	0
Oil	2,315	949	11
Natural Gas	1	696	2
Other	0	0	0
Industrial - Point	519	181	4
- Area	1,200	1,344	17
Coal	0	68	0
Oil	1,718	932	10
Natural Gas	1	525	11
Other	0	0	0
Comm/Instit - Point	878	521	8
- Area	320	551	19
Coal	49	16	0
Oil	1,148	555	9
Natural Gas	1	501	18
Other	0	0	0
Internal Comb. (Point)	0	0	0
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	0	0
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	310	307	5,966
Chemical Manufacturing	0	0	707
Food/Agriculture	0	0	0
Primary Metals	0	0	0
Secondary Metals	0	0	0
Mineral Products	310	303	11
Petroleum Industry	0	0	0
Wood Products	0	0	0
Organic Solvent Evap	0	4	5,149
Petroleum Storage/Trans	0	0	95
Other/Not Classified	0	0	4
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	35	167	2,394
Residential (Area)	29	151	2,336
Other	6	16	58
TRANSPORTATION (Area)	1,490	23,230	20,528
Gasoline Vehicles	941	18,903	18,497
Diesel Fuel Vehicles	487	3,859	610
Rail	14	91	22
Aircraft	26	231	273
Vessels	22	146	1,126
MISCELLANEOUS AREA	0	26	28,806
Forest Fires	0	0	0
Structural Fires	0	26	212
Forest Managed Burning	0	0	0
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	25,052
Gasoline Stn. Evap. Loss	0	0	3,542
ADDITIONAL AREA			3,118
TSDFs			0
Petroleum Fugitives			0
Bulk Terminals/Plants			1,384
Other			1,734
GRAND TOTAL	9,227	30,318	67,301
- POINT	4,023	2,654	5,991
- AREA	5,204	27,664	61,310

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

South Carolina

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	192,559	111,318	1,881
- Area	6,447	11,196	29,437
External Combustion	199,006	122,366	31,271
Residential (Area)	1,517	2,922	28,266
Coal	356	28	104
Oil	1,024	638	18
Natural Gas	5	1,268	67
Wood	132	988	28,077
Electric Gen. (Point)	144,639	82,293	305
Coal	144,597	82,128	268
Oil	35	34	0
Natural Gas	3	57	0
Other	4	74	37
Industrial - Point	46,855	28,741	1,509
- Area	3,100	6,809	130
Coal	41,126	23,561	103
Oil	8,208	1,894	18
Natural Gas	10	7,246	132
Other	611	2,849	1,386
Comm/Instit - Point	1,065	136	20
- Area	1,830	1,465	41
Coal	1,696	343	22
Oil	1,196	485	3
Natural Gas	3	773	36
Other	0	0	0
Internal Comb. (Point)	0	148	47
Electric Gen. (Oil)	0	63	4
Electric Gen. (N. Gas)	0	11	0
Industrial (Nat. Gas)	0	0	0
Industrial (Other)	0	74	43
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	26,949	6,828	24,061
Chemical Manufacturing	0	395	5,462
Food/Agriculture	0	0	0
Primary Metals	171	1	0
Secondary Metals	728	0	0
Mineral Products	10,386	5,153	93
Petroleum Industry	0	0	0
Wood Products	4,153	1,223	666
Organic Solvent Evap	52	12	17,069
Petroleum Storage/Trans	0	0	751
Other/Not Classified	11,459	44	20
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	238	1,595	12,602
Residential (Area)	237	1,539	12,326
Other	1	56	276
TRANSPORTATION (Area)	10,407	124,268	109,818
Gasoline Vehicles	4,089	78,459	88,328
Diesel Fuel Vehicles	4,600	37,919	5,203
Rail	843	5,439	1,319
Aircraft	142	1,248	2,242
Vessels	733	1,203	12,726
MISCELLANEOUS AREA	139	3,847	98,749
Forest Fires	0	118	566
Structural Fires	0	74	585
Forest Managed Burning	139	3,655	13,061
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	69,366
Gasoline Stn. Evap. Loss	0	0	15,171
ADDITIONAL AREA			79,147
TSDFs			26,226
Petroleum Fugitives			0
Bulk Terminals/Plants			6,430
Other			46,491
GRAND TOTAL	236,739	259,052	355,695
- POINT	219,508	118,146	25,942
- AREA	17,231	140,906	329,753

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

South Dakota

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	33,937	16,001	214
- Area	3,022	4,649	3,131
External Combustion	36,959	20,650	3,345
Residential (Area)	521	1,254	3,092
Coal	30	0	12
Oil	482	300	2
Natural Gas	2	851	36
Wood	7	103	3,042
Electric Gen. (Point)	33,664	15,660	85
Coal	32,943	14,046	81
Oil	721	1,010	3
Natural Gas	0	604	1
Other	0	0	0
Industrial - Point	112	258	129
- Area	2,195	2,723	18
Coal	2,052	2,045	5
Oil	241	79	1
Natural Gas	0	617	12
Other	14	240	129
Comm/Instit - Point	161	83	0
- Area	306	672	21
Coal	176	87	0
Oil	289	148	0
Natural Gas	2	520	21
Other	0	0	0
Internal Comb. (Point)	0	0	0
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	0	0
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	2,506	1,082	5,316
Chemical Manufacturing	0	0	0
Food/Agriculture	0	0	0
Primary Metals	0	0	0
Secondary Metals	0	0	0
Mineral Products	1,331	1,082	0
Petroleum Industry	0	0	0
Wood Products	0	0	0
Organic Solvent Evap	0	0	4,070
Petroleum Storage/Trans	0	0	1,145
Other/Not Classified	1,175	0	101
SOLID WASTE DISPOSAL - Point	7	64	69
- Area	72	446	4,176
Residential (Area)	66	432	4,139
Other	13	78	106
TRANSPORTATION (Area)	3,483	46,632	35,200
Gasoline Vehicles	1,045	23,175	30,072
Diesel Fuel Vehicles	2,387	22,941	3,183
Rail	4	64	6
Aircraft	41	401	733
Vessels	6	51	1,206
MISCELLANEOUS AREA	140	3,829	30,761
Forest Fires	134	3,659	17,576
Structural Fires	0	10	148
Forest Managed Burning	6	160	572
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	8,975
Gasoline Stn. Evap. Loss	0	0	3,490
ADDITIONAL AREA			5,092
TSDFs			0
Petroleum Fugitives			0
Bulk Terminals/Plants			4,062
Other			1,030
GRAND TOTAL	43,167	72,703	83,959
- POINT	36,450	17,147	5,599
- AREA	6,717	55,556	78,360

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Tennessee

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point.....	901,924	250,601	6,206
- Area......	13,455	13,623	112,369
External Combustion........	913,298	248,953	118,046
Residential (Area)......	2,102	6,829	112,240
Coal..................	746	53	197
Oil	829	519	17
Natural Gas...........	7	2,450	122
Wood..................	520	3,807	111,904
Electric Gen. (Point)...	804,856	196,992	772
Coal..................	801,302	196,198	731
Oil	3,554	794	41
Natural Gas...........	0	0	0
Other.................	0	0	0
Industrial - Point......	91,882	37,434	4,725
- Area.......	7,838	2,896	7
Coal	86,299	30,974	920
Oil	8,854	1,561	93
Natural Gas...........	2,659	4,827	377
Other.................	1,908	2,968	3,342
Comm/Instit - Point.....	3,105	904	180
- Area......	3,515	3,898	122
Coal..................	3,839	864	169
Oil	2,772	1,542	16
Natural Gas...........	8	2,381	116
Other.................	1	15	1
Internal Comb. (Point)....	2,081	15,271	529
Electric Gen. (Oil).....	2,064	3,704	89
Electric Gen. (N. Gas)..	0	0	0
Industrial (Nat. Gas)...	5	10,860	383
Industrial (Other)......	12	703	34
Commercial/Inst.........	0	0	0
Engine Testing..........	0	4	23
INDUSTRIAL PROCESS (Point)	42,545	26,079	90,005
Chemical Manufacturing....	9,083	13,091	51,088
Food/Agriculture..........	116	86	314
Primary Metals............	19,195	1,400	417
Secondary Metals..........	1,820	2,896	1,027
Mineral Products..........	3,410	3,265	310
Petroleum Industry........	5,419	1,238	24
Wood Products.............	3,147	3,721	2,193
Organic Solvent Evap......	9	212	27,246
Petroleum Storage/Trans...	0	0	1,263
Other/Not Classified......	346	170	6,123
SOLID WASTE DISPOSAL - Point	468	772	487
- Area	280	1,878	16,319
Residential (Area)........	278	1,821	16,105
Other.....................	.470	829	701
TRANSPORTATION (Area).......	17,934	217,287	150,551
Gasoline Vehicles.........	6,363	125,176	125,690
Diesel Fuel Vehicles......	8,344	70,255	9,834
Rail......................	2,631	17,047	4,139
Aircraft..................	224	2,121	2,104
Vessels...................	372	2,688	8,784
MISCELLANEOUS AREA..........	27	1,050	126,325
Forest Fires..............	0	11	113
Structural Fires..........	0	108	882
Forest Managed Burning....	27	931	3,320
Agricultural Burning......	0	0	0
Solvent Evap. Loss........	0	0	98,577
Gasoline Stn. Evap. Loss..	0	0	23,433
ADDITIONAL AREA.............			52,379
TSDFs.....................			2,337
Petroleum Fugitives.......			3,180
Bulk Terminals/Plants.....			8,708
Other.....................			38,153
GRAND TOTAL	976,633	511,290	554,641
- POINT	944,937	277,452	96,698
- AREA	31,696	233,838	457,943

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Texas

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	724,319	898,998	32,296
- Area	130,603	521,875	38,274
External Combustion	849,773	1,265,208	59,161
Residential (Area)	1,308	13,871	25,909
Coal	151	3	25
Oil	989	437	6
Natural Gas	55	12,584	660
Wood	113	847	25,218
Electric Gen. (Point)	578,489	550,423	11,266
Coal	545,988	342,950	5,640
Oil	26,436	ERR	22
Natural Gas	4,012	187,179	5,422
Other	2,053	6,907	182
Industrial - Point	140,338	184,545	9,436
- Area	109,641	492,901	11,890
Coal	56,353	10,367	83
Oil	121,383	45,681	618
Natural Gas	16,246	579,052	13,952
Other	55,997	42,346	6,673
Comm/Instit - Point	343	8,365	185
- Area	19,654	15,103	475
Coal	386	194	0
Oil	19,537	7,616	99
Natural Gas	44	13,374	407
Other	30	2,284	154
Internal Comb. (Point)	5,149	155,665	11,409
Electric Gen. (Oil)	37	293	7
Electric Gen. (N. Gas)	773	22,550	880
Industrial (Nat. Gas)	4,313	129,918	10,136
Industrial (Other)	4	298	53
Commercial/Inst	0	1,228	18
Engine Testing	22	1,378	315
INDUSTRIAL PROCESS (Point)	521,770	261,479	416,372
Chemical Manufacturing	111,231	48,076	199,032
Food/Agriculture	16	57	157
Primary Metals	32,577	3,365	1,373
Secondary Metals	9,640	3,875	498
Mineral Products	59,923	57,006	2,717
Petroleum Industry	295,101	142,995	101,590
Wood Products	9,142	4,097	2,718
Organic Solvent Evap	60	43	22,735
Petroleum Storage/Trans	1,108	1,096	79,764
Other/Not Classified	2,972	869	5,788
SOLID WASTE DISPOSAL - Point	8,959	2,970	1,705
- Area	542	2,916	22,848
Residential (Area)	385	2,592	22,018
Other	9,116	3,294	2,535
TRANSPORTATION (Area)	90,045	788,256	617,702
Gasoline Vehicles	23,179	412,031	504,164
Diesel Fuel Vehicles	31,476	275,048	39,843
Rail	10,757	69,813	16,957
Aircraft	1,565	13,606	21,049
Vessels	23,068	17,758	35,689
MISCELLANEOUS AREA	26	1,097	368,140
Forest Fires	0	45	221
Structural Fires	0	294	2,497
Forest Managed Burning	26	758	2,703
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	281,042
Gasoline Stn. Evap. Loss	0	0	81,677
ADDITIONAL AREA	0	0	826,821
TSDFs	0	0	438,823
Petroleum Fugitives	0	0	210,608
Bulk Terminals/Plants	0	0	31,840
Other	0	0	145,549
GRAND TOTAL	1,476,264	2,477,591	2,324,158
- POINT	1,255,048	1,163,447	450,373
- AREA	221,216	1,314,144	1,873,785

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Utah

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	34,628	74,764	4,290
- Area	13,194	18,092	13,655
External Combustion	47,805	82,254	14,114
Residential (Area)	1,104	3,697	13,388
Coal	953	183	614
Oil	76	30	0
Natural Gas	16	3,055	161
Wood	59	429	12,613
Electric Gen. (Point)	24,414	53,471	282
Coal	24,306	52,889	278
Oil	32	27	0
Natural Gas	76	555	3
Other	0	0	1
Industrial - Point	9,623	10,005	133
- Area	9,617	13,007	224
Coal	3,832	3,701	10
Oil	7,179	1,662	11
Natural Gas	29	9,389	253
Other	8,200	8,260	83
Comm/Instit - Point	574	686	44
- Area	2,473	1,388	43
Coal	1,368	781	20
Oil	1,606	503	5
Natural Gas	1	554	19
Other	72	236	43
Internal Comb. (Point)	17	10,602	3,831
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	9,429	3,381
Industrial (Other)	17	100	8
Commercial/Inst	0	1,073	442
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	18,430	11,970	11,829
Chemical Manufacturing	2,169	495	4
Food/Agriculture	0	0	0
Primary Metals	11,028	4,842	914
Secondary Metals	93	1,739	5
Mineral Products	526	3,045	12
Petroleum Industry	4,554	1,847	1,869
Wood Products	0	0	0
Organic Solvent Evap	0	0	549
Petroleum Storage/Trans	0	0	8,476
Other/Not Classified	60	2	0
SOLID WASTE DISPOSAL - Point	0	85	18
- Area	71	298	4,342
Residential (Area)	48	261	4,282
Other	23	122	78
TRANSPORTATION (Area)	5,412	63,909	76,639
Gasoline Vehicles	1,944	37,223	67,478
Diesel Fuel Vehicles	2,294	18,787	4,434
Rail	1,047	6,789	1,645
Aircraft	113	1,030	1,283
Vessels	14	80	1,799
MISCELLANEOUS AREA	57	1,601	37,606
Forest Fires	1	136	663
Structural Fires	0	27	236
Forest Managed Burning	56	1,438	5,137
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	25,027
Gasoline Stn. Evap. Loss	0	0	6,543
ADDITIONAL AREA			16,759
TSDFs			2,824
Petroleum Fugitives			8,188
Bulk Terminals/Plants			2,214
Other			3,534
GRAND TOTAL	71,792	170,719	165,138
- POINT	53,058	86,819	16,137
- AREA	18,734	83,900	149,001

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Vermont

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	2,543	1,928	709
- Area	3,183	2,588	15,628
External Combustion	5,724	4,514	16,337
Residential (Area)	1,666	1,674	15,612
Coal	26	0	8
Oil	1,569	931	36
Natural Gas	0	214	10
Wood	71	529	15,558
Electric Gen. (Point)	1,211	1,478	624
Coal	1,127	202	1
Oil	18	8	0
Natural Gas	0	26	0
Other	66	1,242	623
Industrial - Point	1,236	429	85
- Area	410	338	5
Coal	275	122	0
Oil	1,319	351	5
Natural Gas	0	149	2
Other	52	145	83
Comm/Instit - Point	94	19	0
- Area	1,107	576	11
Coal	747	251	8
Oil	454	259	1
Natural Gas	0	82	2
Other	0	3	0
Internal Comb. (Point)	2	2	0
Electric Gen. (Oil)	2	2	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	0	0
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	0	0	1,077
Chemical Manufacturing	0	0	0
Food/Agriculture	0	0	0
Primary Metals	0	0	0
Secondary Metals	0	0	0
Mineral Products	0	0	0
Petroleum Industry	0	0	0
Wood Products	0	0	0
Organic Solvent Evap	0	0	1,077
Petroleum Storage/Trans	0	0	0
Other/Not Classified	0	0	0
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	64	358	2,527
Residential (Area)	49	336	2,493
Other	15	22	34
TRANSPORTATION (Area)	1,539	20,294	17,292
Gasoline Vehicles	752	13,665	14,866
Diesel Fuel Vehicles	711	6,066	858
Rail	39	244	60
Aircraft	26	244	300
Vessels	11	75	1,208
MISCELLANEOUS AREA	0	12	13,901
Forest Fires	0	0	0
Structural Fires	0	12	100
Forest Managed Burning	0	0	0
Agricultural Burning	0	0	2
Solvent Evap. Loss	0	0	11,467
Gasoline Stn. Evap. Loss	0	0	2,332
ADDITIONAL AREA	0	0	1,354
TSDFs	0	0	12
Petroleum Fugitives	0	0	0
Bulk Terminals/Plants	0	0	1,037
Other	0	0	304
GRAND TOTAL	7,329	25,180	52.488
- POINT	2.543	1,928	1,786
- AREA	4,786	23,252	50,702

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Virginia

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	229,254	119,614	1,861
- Area	27,024	26,243	107,735
External Combustion	256,253	145,708	109,591
Residential (Area)	5,618	9,191	107,457
Coal	1,004	117	420
Oil	4,105	2,568	97
Natural Gas	15	2,875	144
Wood	494	3,631	106,796
Electric Gen. (Point)	134,340	77,857	245
Coal	130,327	76,386	223
Oil	4,013	1,259	21
Natural Gas	0	155	1
Other	0	57	0
Industrial - Point	86,328	39,518	1,582
- Area	16,456	13,655	183
Coal	81,895	36,833	144
Oil	20,604	3,702	19
Natural Gas	6	9,685	160
Other	279	2,953	1,442
Comm/Instit - Point	8,561	2,090	29
- Area	4,950	3,397	95
Coal	3,863	1,116	14
Oil	9,637	2,666	22
Natural Gas	7	1,694	79
Other	4	11	9
Internal Comb. (Point)	25	149	5
Electric Gen. (Oil)	21	54	0
Electric Gen. (N. Gas)	0	29	0
Industrial (Nat. Gas)	0	0	0
Industrial (Other)	0	0	0
Commercial/Inst	4	66	5
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	33,405	19,048	84,183
Chemical Manufacturing	3,971	12,243	4,991
Food/Agriculture	277	70	1,188
Primary Metals	5,316	26	226
Secondary Metals	345	51	587
Mineral Products	5,057	4,171	1,742
Petroleum Industry	2,282	572	612
Wood Products	9,249	1,915	69
Organic Solvent Evap	0	0	64,735
Petroleum Storage/Trans	0	0	4,639
Other/Not Classified	6,908	0	5,194
SOLID WASTE DISPOSAL - Point	166	291	599
- Area	334	1,969	10,624
Residential (Area)	266	1,834	10,303
Other	234	426	920
TRANSPORTATION (Area)	21,302	222,558	174,198
Gasoline Vehicles	6,900	130,682	148,441
Diesel Fuel Vehicles	7,771	64,867	9,390
Rail	3,379	21,924	5,323
Aircraft	232	2,078	2,860
Vessels	3,020	3,007	8,184
MISCELLANEOUS AREA	3	396	128,960
Forest Fires	0	5	65
Structural Fires	0	106	915
Forest Managed Burning	3	285	1,035
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	101,526
Gasoline Stn. Evap. Loss	0	0	25,419
ADDITIONAL AREA			69,707
TSDFs			2,448
Petroleum Fugitives			2,856
Bulk Terminals/Plants			11,259
Other			53,144
GRAND TOTAL	311,488	390,119	577,867
- POINT	262,825	138,953	86,643
- AREA	48,663	251,166	491,224

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Washington

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point.....	88,654	59,659	6,641
- Area......	11,201	17,162	107,026
External Combustion.......	99,672	74,789	110,456
Residential (Area)......	4,347	6,768	106,744
Coal..................	960	154	515
Oil	2,888	1,205	42
Natural Gas...........	7	1,799	93
Wood..................	492	3,610	106,094
Electric Gen. (Point)...	68,827	38,313	552
Coal..................	68,751	37,407	182
Oil	24	8	0
Natural Gas...........	0	0	0
Other.................	52	898	370
Industrial - Point......	17,085	18,225	2,814
- Area.......	1,932	6,282	150
Coal	3,736	2,196	72
Oil	12,818	5,001	197
Natural Gas...........	454	7,653	179
Other.................	2,009	9,657	2,516
Comm/Instit - Point.....	2,559	1,089	64
- Area......	4,922	4,112	132
Coal..................	1,337	761	39
Oil	6,114	2,357	42
Natural Gas...........	30	1,916	90
Other.................	0	167	25
Internal Comb. (Point)....	183	2,032	3,211
Electric Gen. (Oil).....	0	0	0
Electric Gen. (N. Gas)..	0	0	0
Industrial (Nat. Gas)...	0	249	18
Industrial (Other)......	0	0	0
Commercial/Inst.........	136	1,480	2,050
Engine Testing..........	47	303	1,143
INDUSTRIAL PROCESS (Point)	48,622	12,992	22,322
Chemical Manufacturing....	1	1,381	302
Food/Agriculture..........	37	231	3
Primary Metals............	28,110	677	78
Secondary Metals..........	204	11	0
Mineral Products..........	2,879	4,024	78
Petroleum Industry........	10,914	3,975	5,117
Wood Products.............	6,072	2,556	4,845
Organic Solvent Evap......	0	0	5,971
Petroleum Storage/Trans...	218	95	5,918
Other/Not Classified......	187	42	10
SOLID WASTE DISPOSAL - Point	58	80	236
- Area	225	1,179	15,751
Residential (Area)........	205	1,124	15,575
Other.....................	78	135	412
TRANSPORTATION (Area).......	19,009	165,871	137,515
Gasoline Vehicles.........	4,750	101,713	118,353
Diesel Fuel Vehicles......	5,079	44,595	5,903
Rail......................	1,748	11,357	2,757
Aircraft..................	291	2,552	3,566
Vessels...................	7,141	5,654	6,936
MISCELLANEOUS AREA..........	638	17,396	155,693
Forest Fires..............	55	1,484	7,130
Structural Fires..........	0	94	767
Forest Managed Burning....	583	15,576	55,686
Agricultural Burning......	0	242	1,572
Solvent Evap. Loss........	0	0	72,873
Gasoline Stn. Evap. Loss..	0	0	17,665
ADDITIONAL AREA.............			33,899
TSDFs.....................			1,236
Petroleum Fugitives.......			22,254
Bulk Terminals/Plants.....			6,258
Other.....................			4,151
GRAND TOTAL	168,407	274,339	479,083
- POINT	137,334	72,731	29,199
- AREA	31,073	201,608	449,884

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

West Virginia

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	998,039	361,472	1,627
- Area	2,885	10,489	44,925
External Combustion	1,000,923	357,783	46,169
Residential (Area)	1,035	3,679	44,742
Coal	440	29	116
Oil	383	237	6
Natural Gas	7	1,903	103
Wood	205	1,510	44,517
Electric Gen. (Point)	931,722	316,732	1,132
Coal	931,484	316,512	1,096
Oil	234	148	0
Natural Gas	0	0	0
Other	4	72	36
Industrial - Point	65,030	30,425	104
- Area	1,279	5,623	142
Coal	59,294	19,026	73
Oil	6,594	2,278	34
Natural Gas	129	14,263	137
Other	292	481	2
Comm/Instit - Point	1,286	137	8
- Area	571	1,187	41
Coal	1,436	149	2
Oil	418	287	1
Natural Gas	2	886	40
Other	1	2	6
Internal Comb. (Point)	1	14,178	383
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	1	14,178	383
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	51,432	20,233	77,237
Chemical Manufacturing	6,686	891	24,473
Food/Agriculture	0	0	0
Primary Metals	27,396	3,273	8,675
Secondary Metals	32	4,287	1,919
Mineral Products	11,259	5,670	2,145
Petroleum Industry	4,523	793	893
Wood Products	11	36	9
Organic Solvent Evap	23	5,240	37,515
Petroleum Storage/Trans	0	0	1,533
Other/Not Classified	1,502	43	75
SOLID WASTE DISPOSAL - Point	33	3	3
- Area	171	1,165	6,384
Residential (Area)	171	1,155	6,354
Other	33	13	33
TRANSPORTATION (Area)	5,847	68,001	49,518
Gasoline Vehicles	2,014	37,895	41,643
Diesel Fuel Vehicles	1,998	16,926	2,437
Rail	630	4,087	992
Aircraft	45	426	624
Vessels	1,160	8,667	3,822
MISCELLANEOUS AREA	0	49	31,224
Forest Fires	0	0	3
Structural Fires	0	49	415
Forest Managed Burning	0	0	0
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	23,425
Gasoline Stn. Evap. Loss	0	0	7,381
ADDITIONAL AREA			199,815
TSDFs			178,783
Petroleum Fugitives			882
Bulk Terminals/Plants			3,424
Other			16,725
GRAND TOTAL	1,058,407	461,412	410,733
- POINT	1,049,504	381,708	78,867
- AREA	8,903	79,704	331,866

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Wisconsin

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point.....	476,583	144,246	4,251
- Area......	7,375	25,853	72,202
External Combustion.......	483,958	169,458	76,385
Residential (Area)......	4,424	11,947	71,818
Coal..................	0	0	0
Oil	4,058	2,546	97
Natural Gas...........	34	6,975	367
Wood..................	332	2,426	71,354
Electric Gen. (Point)...	379,568	111,400	689
Coal..................	379,432	110,289	563
Oil	108	40	0
Natural Gas...........	1	653	3
Other.................	27	418	123
Industrial - Point......	93,714	31,457	3,460
- Area.......	230	8,697	183
Coal	90,407	22,951	159
Oil	1,774	447	1
Natural Gas...........	20	11,833	204
Other.................	1,743	4,923	3,279
Comm/Instit - Point.....	3,301	748	34
- Area......	2,721	5,209	201
Coal..................	3,345	744	30
Oil	2,662	1,553	12
Natural Gas...........	15	3,658	189
Other.................	0	2	4
Internal Comb. (Point)....	0	641	68
Electric Gen. (Oil).....	0	2	0
Electric Gen. (N. Gas)..	0	8	0
Industrial (Nat. Gas)...	0	367	9
Industrial (Other)......	0	0	0
Commercial/Inst.........	0	264	6
Engine Testing..........	0	0	53
INDUSTRIAL PROCESS (Point)	16,236	4,787	45,532
Chemical Manufacturing....	908	4	1,502
Food/Agriculture..........	0	22	37
Primary Metals............	0	0	0
Secondary Metals..........	431	390	186
Mineral Products..........	1,009	1,592	28
Petroleum Industry........	1,710	198	623
Wood Products.............	9,113	431	201
Organic Solvent Evap......	0	7	41,382
Petroleum Storage/Trans...	0	0	789
Other/Not Classified......	3,065	2,143	784
SOLID WASTE DISPOSAL - Point	128	164	100
- Area	660	2,369	18,785
Residential (Area)........	278	1,729	17,723
Other.....................	510	804	1,162
TRANSPORTATION (Area).......	13,366	171,059	147,073
Gasoline Vehicles.........	5,051	102,845	119,878
Diesel Fuel Vehicles......	6,534	57,138	8,206
Rail......................	1,330	8,625	2,096
Aircraft..................	123	1,165	1,469
Vessels...................	328	1,286	15,424
MISCELLANEOUS AREA..........	0	122	127,444
Forest Fires..............	0	0	0
Structural Fires..........	0	122	988
Forest Managed Burning....	0	0	0
Agricultural Burning......	0	0	0
Solvent Evap. Loss........	0	0	107,897
Gasoline Stn. Evap. Loss..	0	0	18,559
ADDITIONAL AREA.............	0	0	16,445
TSDFs.....................	0	0	0
Petroleum Fugitives.......	0	0	1,696
Bulk Terminals/Plants.....	0	0	9,439
Other.....................	0	0	5,310
GRAND TOTAL	514,348	348,600	431,832
- POINT	492,947	149,197	49,883
- AREA	21,401	199,403	381,949

TOTAL 1985 EMISSIONS BY CATEGORY FOR SULFUR DIOXIDE, NITROGEN OXIDES, AND VOLATILE ORGANIC COMPOUNDS (TONS)

Wyoming

EMISSION CATEGORIES	SO2	NOx	VOC
FUEL COMBUSTION - Point	153,647	115,986	3,748
- Area	16,055	49,704	9,343
External Combustion	169,702	155,432	10,253
Residential (Area)	679	1,209	8,212
Coal	590	71	231
Oil	51	20	0
Natural Gas	2	848	43
Wood	36	270	7,938
Electric Gen. (Point)	138,035	91,010	831
Coal	137,914	90,725	828
Oil	121	53	2
Natural Gas	0	232	1
Other	0	0	0
Industrial - Point	15,328	14,597	78
- Area	12,881	47,283	1,093
Coal	22,841	17,047	25
Oil	4,614	1,828	40
Natural Gas	23	42,759	1,069
Other	731	246	37
Comm/Instit - Point	284	121	1
- Area	2,495	1,212	38
Coal	945	303	8
Oil	1,833	573	7
Natural Gas	1	457	24
Other	0	0	0
Internal Comb. (Point)	0	10,258	2,838
Electric Gen. (Oil)	0	0	0
Electric Gen. (N. Gas)	0	0	0
Industrial (Nat. Gas)	0	10,258	2,838
Industrial (Other)	0	0	0
Commercial/Inst	0	0	0
Engine Testing	0	0	0
INDUSTRIAL PROCESS (Point)	36,903	9,298	14,069
Chemical Manufacturing	3,615	169	11
Food/Agriculture	2	43	0
Primary Metals	1,599	541	23
Secondary Metals	437	220	0
Mineral Products	2,723	4,516	40
Petroleum Industry	28,156	3,607	11,596
Wood Products	0	0	0
Organic Solvent Evap	0	0	0
Petroleum Storage/Trans	0	5	2,389
Other/Not Classified	371	197	10
SOLID WASTE DISPOSAL - Point	0	0	0
- Area	48	194	1,832
Residential (Area)	25	158	1,774
Other	23	36	58
TRANSPORTATION (Area)	5,101	50,755	36,836
Gasoline Vehicles	860	17,144	28,727
Diesel Fuel Vehicles	2,375	21,429	4,261
Rail	1,837	11,929	2,897
Aircraft	25	228	362
Vessels	4	25	589
MISCELLANEOUS AREA	12	491	9,256
Forest Fires	5	245	1,171
Structural Fires	0	10	90
Forest Managed Burning	7	236	839
Agricultural Burning	0	0	0
Solvent Evap. Loss	0	0	4,256
Gasoline Stn. Evap. Loss	0	0	2,900
ADDITIONAL AREA	0	0	15,222
TSDFs	0	0	2,132
Petroleum Fugitives	0	0	8,476
Bulk Terminals/Plants	0	0	1,951
Other	0	0	2,663
GRAND TOTAL	211,766	226,428	90,306
- POINT	190,550	125,284	17,817
- AREA	21,216	101,144	72,489

APPENDIX D

SCC EMISSIONS LISTING

SO2, NOx, AND VOC EMISSIONS SUMMARY: 1985 TOTALS BY SIX DIGIT SCC FOR THE 48 CONTIGUOUS STATES AND THE DISTRICT OF COLUMBIA (TPY)

SCC	SO2	NOx	VOC
101001	22,370	14,802	303
101002	14,835,300	5,602,622	35,078
101003	627,786	394,713	6,191
101004	597,530	187,150	2,779
101005	55,982	33,912	469
101006	6,455	448,342	6,961
101007	160	11,457	103
101008	18,904	2,327	7
101009	232	3,734	1,598
101010	0	5	0
101012	121	1,876	406
101013	2,032	182	99
102001	11,141	2,893	16
102002	1,080,832	384,206	4,258
102003	48,511	9,533	232
102004	396,860	138,644	4,348
102005	19,483	23,251	708
102006	38,878	296,501	8,555
102007	105,381	92,773	3,833
102008	11,910	6,764	149
102009	15,109	84,092	49,796
102010	25	652	19
102011	170	1,691	2,571
102012	2,641	2,860	205
102013	10,271	11,856	3,182
102014	8,478	2,581	137
103001	3,386	1,184	86
103002	114,637	23,371	730
103003	973	467	210
103004	43,396	16,395	469
103005	5,748	3,006	96
103006	734	22,104	319
103007	16	375	105
103009	81	2,766	465
103010	0	3	0
103012	300	1,084	219
103013	0	119	263
105001	641	2,885	1,792
105002	149	679	2
201001	9,950	15,415	638
201002	1,082	53,097	2,265
201009	44	831	83
202001	387	4,545	309
202002	31,023	633,926	71,822
202003	14	111	219
202004	122	2,031	109

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SO2, NOx, AND VOC EMISSIONS SUMMARY: 1985 TOTALS BY SIX DIGIT SCC FOR THE 48 CONTIGUOUS STATES AND THE DISTRICT OF COLUMBIA (TPY)

SCC	SO2	NOx	VOC
202005	669	1,300	67
202009	421	205	18
202010	0	205	72
203001	1,691	3,461	59
203002	26	12,592	969
203003	183	1,579	2,248
203010	0	183	32
204001	224	1,998	1,774
204002	1	13	20
204003	23	1,369	30
204004	161	2,296	1,653
288888	215	1,389	514
301001	25	624	4,935
301003	1,094	24,353	7,425
301005	28,033	1,286	49,978
301006	4,643	3,661	37,418
301007	0	0	159
301008	19	2,223	1,233
301009	145	105	224
301010	11	1,705	326
301011	1,540	13	234
301012	391	49	0
301013	8	32,271	0
301014	0	54	7,414
301015	2	4	767
301016	3	22	574
301018	1,884	18,082	81,431
301019	45	235	402
301020	0	1	2,758
301021	42	787	22
301022	2,091	1	13
301023	215,172	2,010	51
301024	141	8	7,169
301025	0	0	19,910
301026	4,663	1,705	45,548
301027	3	291	4
301028	255	65	0
301029	396	96	1
301030	1,554	1,252	378
301031	0	0	26,906
301032	128,742	16,346	1,308
301033	711	272	4,046
301034	126	808	4,564
301035	5,682	569	131
301040	0	18	550
301041	13	36	52

SO2, NOx, AND VOC EMISSIONS SUMMARY: 1985 TOTALS BY SIX DIGIT SCC FOR THE 48 CONTIGUOUS STATES AND THE DISTRICT OF COLUMBIA (TPY)

SCC	SO2	NOx	VOC
301042	0	14	2,230
301050	0	422	1,184
301060	222	24	8,763
301070	4	62	85
301091	0	14	2,274
301100	0	1	6,134
301111	0	0	298
301112	287	0	0
301120	0	0	5,546
301121	0	1	246
301125	3	674	5,385
301126	57	0	33
301127	0	0	6
301132	111	535	3,867
301133	0	0	70
301137	486	6	1,087
301140	0	55	470
301152	0	0	7
301153	0	1,834	6,396
301156	0	0	1
301157	0	3	197
301167	0	0	767
301169	2	76	394
301174	0	598	2,104
301176	0	0	87
301181	1	3	279
301197	4,184	12,604	28,396
301202	0	148	206
301205	0	0	11
301206	1	29	1,235
301211	0	14	76
301250	963	3,125	8,128
301251	0	0	1,425
301252	0	0	135
301253	0	0	435
301254	3,281	1,846	18,461
301258	5	1,391	4,707
301304	0	0	1
301305	0	0	10
301800	1,945	537	3,073
301810	0	10	491
301820	0	0	1,481
301830	0	357	6,400
301840	0	0	5,155
301870	0	9	38
301875	0	0	13

SO2, NOx, AND VOC EMISSIONS SUMMARY: 1985 TOTALS BY SIX DIGIT SCC FOR THE 48 CONTIGUOUS STATES AND THE DISTRICT OF COLUMBIA (TPY)

SCC	SO2	NOx	VOC
301888	52	528	11,769
301900	44,201	10,505	1,601
301999	48,359	27,319	71,222
302001	6	6	0
302002	7	102	57
302003	0	0	110
302005	0	8	0
302006	0	180	3
302007	114	106	3,622
302008	0	54	0
302009	303	113	1,116
302010	0	54	23,806
302012	0	0	3
302013	48	34	3
302014	80	2,038	4,193
302015	7	13	2
302016	1,917	682	388
302017	0	2	0
302018	0	0	274
302019	42	34	8,614
302020	37	202	0
302030	0	16	1
302032	1	0	632
302033	7	0	742
302036	0	0	740
302888	0	0	92
302900	0	0	0
302999	812	1,194	6,116
303000	0	2,095	18
303001	46,231	970	434
303002	12,154	1,402	39
303003	73,028	11,735	31,140
303004	1,162	319	23
303005	636,964	1,039	2
303006	9,430	456	8,895
303007	587	0	0
303008	43,846	11,651	13,232
303009	26,720	19,122	1,587
303010	98,776	1,744	4
303011	986	4	1
303012	0	136	0
303014	2,515	1,132	171
303023	1,547	1,467	26
303030	7,641	4	1
303888	12,060	93	1
303900	1,985	362	17

SO2, NOx, AND VOC EMISSIONS SUMMARY: 1985 TOTALS BY SIX DIGIT SCC FOR THE 48 CONTIGUOUS STATES AND THE DISTRICT OF COLUMBIA (TPY)

SCC	SO2	NOx	VOC
303999	579	483	43
304001	3,783	3,923	8,009
304002	9	79	277
304003	2,545	1,083	6,600
304004	20,721	905	479
304005	1,347	990	167
304006	27	538	3
304007	13,611	7,664	425
304008	3,094	199	19
304009	0	32	0
304010	0	10	0
304020	3,978	298	192
304022	4	12	2
304050	0	82	147
304900	34	4,166	1,667
304999	977	586	420
305001	75	157	836
305002	2,124	913	425
305003	2,196	813	489
305004	199	4	0
305005	149	721	1
305006	112,502	98,211	284
305007	79,305	38,962	227
305008	2,569	1,375	18
305009	1,389	379	7
305010	12,567	5,074	4,781
305011	37	56	0
305012	2,491	6,286	3,126
305014	21,506	47,783	5,223
305015	9,397	1,866	33
305016	24,568	28,861	1,083
305017	8	58	32
305018	494	1,158	71
305019	4,650	1,144	20
305020	6,195	768	57
305021	0	4	0
305024	253	51	25
305025	5	32	0
305026	1	111	2
305030	0	0	32
305032	5	5	57
305040	356	552	8
305104	0	0	148
305105	0	0	12
305150	388	111	0
305888	0	2	0

SO2, NOx, AND VOC EMISSIONS SUMMARY: 1985 TOTALS BY SIX DIGIT SCC FOR THE 48 CONTIGUOUS STATES AND THE DISTRICT OF COLUMBIA (TPY)

SCC	SO2	NOx	VOC
305900	133	52	0
305999	5,685	5,325	281
306001	162,254	156,339	11,295
306002	204,974	40,038	24,717
306003	7,273	1,208	1,120
306004	15,760	4,419	9,169
306005	1,080	123	47,194
306006	110	301	11,884
306007	0	376	9,591
306008	12,311	219	40,712
306009	28,987	3,892	943
306010	135	0	15
306011	91	0	2,023
306012	26,920	2,235	466
306014	12,560	1,083	122
306015	0	3	0
306099	29,318	152	3
306100	0	1	2,740
306888	1,742	2,085	34,233
306999	17,099	2,839	12,213
307001	122,672	71,221	33,431
307002	6,692	162	802
307003	988	22	395
307004	3	11	791
307005	0	6	185
307007	144	791	4,123
307008	16	771	322
307011	0	79	104
307013	13	0	131
307020	39	3	1,143
307030	1	0	0
307888	0	38	1,940
307900	52	246	18
307999	25	127	2,254
308001	5	35	20,185
308006	0	0	1,526
308007	767	4	9,244
308900	3	3	0
308999	1	0	4,625
309001	0	72	180
309002	0	0	39
309010	0	6	50
309011	68	1,479	24
309016	0	0	257
309020	0	0	568
309025	0	0	0

SO2, NOx, AND VOC EMISSIONS SUMMARY: 1985 TOTALS BY SIX DIGIT SCC FOR THE 48 CONTIGUOUS STATES AND THE DISTRICT OF COLUMBIA (TPY)

SCC	SO2	NOx	VOC
309030	0	0	271
309040	0	0	0
309888	0	5	325
309999	196	357	1,611
310001	1,840	21	1,797
310002	264,919	69,257	18,110
310004	1,077	3,920	222
310888	34	25	2,695
312999	1	2	198
313070	0	0	0
313999	463	0	268
314010	0	0	0
314999	0	0	154
315020	0	0	431
320999	1	1	1,348
330001	24	83	1,977
330002	0	0	3,115
330003	0	0	74
330888	0	0	3,450
390001	177	0	3
390002	102,053	9,756	21
390003	71	68	0
390004	25,454	5,560	30
390005	5,735	2,602	712
390006	12,428	29,516	6,664
390007	6,441	3,656	102
390008	9,643	3,231	13
390009	2	157	106
390010	4	63	514
390012	0	35	6
390013	166	0	0
399900	451	699	258
399999	719	1,796	26,832
401001	0	0	1,177
401002	28	41	25,836
401003	0	0	32,015
401004	0	0	15
401888	0	0	5,395
402001	0	85	68,352
402002	0	0	2,161
402003	30	0	6,807
402004	0	0	18,812
402005	0	1	17,405
402006	0	7	7,452
402007	0	7	12,672
402008	714	2,077	45,022

SO2, NOx, AND VOC EMISSIONS SUMMARY: 1985 TOTALS BY SIX DIGIT SCC FOR THE 48 CONTIGUOUS STATES AND THE DISTRICT OF COLUMBIA (TPY)

SCC	SO2	NOx	VOC
402009	0	1	81,352
402010	28	5,797	4,673
402011	0	0	14,693
402012	0	0	18
402013	0	1	53,893
402014	0	9	935
402015	0	0	166
402016	0	6	29,710
402017	0	12	18,306
402018	0	3	13,525
402019	0	0	26,979
402020	0	0	1,658
402021	30	0	1,792
402022	0	0	8,853
402023	0	0	1,463
402024	0	0	23,335
402025	0	3	14,761
402888	0	0	1,973
402999	0	7	85,675
403001	4	4	20,512
403002	119	0	11,957
403003	0	0	697
403010	0	898	72,811
403011	117	15	42,571
403012	3	3	1,625
403888	0	5	5,693
403999	0	0	10,343
404001	11	15	32,205
404002	0	0	7,144
404003	0	0	3,210
404004	0	0	355
405001	0	86	14,417
405002	0	7	3,778
405003	0	132	22,096
405004	0	10	4,738
405005	3	20	76,591
405006	0	0	42
405007	0	0	1,860
405888	0	9	1,419
406001	0	6	36,845
406002	245	98	29,998
406003	0	0	933
406004	0	0	360
406888	961	33	7,567
407004	0	0	24
407008	0	0	741

SO2, NOx, AND VOC EMISSIONS SUMMARY: 1985 TOTALS BY SIX DIGIT SCC FOR THE 48 CONTIGUOUS STATES AND THE DISTRICT OF COLUMBIA (TPY)

SCC	SO2	NOx	VOC
407016	0	0	68
407020	0	0	3
407032	0	0	6
407036	0	0	218
407040	0	0	88
407044	0	0	103
407060	0	0	553
407068	0	0	118
407076	0	0	2
407080	0	0	10
407084	0	0	466
407172	0	0	16
407180	0	0	76
407208	0	0	38
407220	0	0	6
407228	0	0	2
407232	0	0	1
407816	0	141	179
407820	0	0	559
407860	0	0	13
407999	0	0	3
408999	0	0	2,649
490001	0	0	768
490002	0	0	70
490900	0	0	3
490999	52	17	72,489
501001	5,601	6,434	5,237
501002	0	428	24
501005	147	911	635
501007	0	0	34
502001	3,377	4,158	824
502002	0	0	2
502003	0	5	26
502005	103	1,220	78
502006	105	126	61
503001	8,895	3,902	2,856
503002	1	95	60
503005	483	371	79
503006	155	80	297
503007	443	43	470
503008	0	0	114
503900	735	478	318
TOTAL	21,059,885	9,511,639	2,369,038

1985 NAPAP AREA SOURCE CATEGORIES

SCC	Category Description
001	Residential Fuel - Anthracite Coal
002	Residential Fuel - Bituminous Coal
003	Residential Fuel - Distillate Oil
004	Residential Fuel - Residual Oil
005	Residential Fuel - Natural Gas
006	Residential Fuel - Wood
007	Commercial/Institutional Fuel - Anthracite Coal
008	Commercial/Institutional Fuel - Bituminous Coal
009	Commercial/Institutional Fuel - Distillate Oil
010	Commercial/Institutional Fuel - Residual Oil
011	Commercial/Institutional Fuel - Natural Gas
012	Commercial/Institutional Fuel - Wood
013	Industrial Fuel - Anthracite Coal
014	Industrial Fuel - Bituminous Coal
015	Industrial Fuel - Coke
016	Industrial Fuel - Distillate Oil
017	Industrial Fuel - Residual Oil
018	Industrial Fuel - Natural Gas
019	Industrial Fuel - Wood
020	Industrial Fuel - Process Gas
021	On-Site Incineration - Residential
022	On-Site Incineration - Industrial
023	On-Site Incineration - Commercial/Institutional
024	Open Burning - Residential
025	Open Burning - Industrial
026	Open Burning - Commercial/Residential
027	Light Duty Gasoline Vehicles - Limited Access Roads
028	Light Duty Gasoline Vehicles - Rural Roads
029	Light Duty Gasoline Vehicles - Suburban Roads
030	Light Duty Gasoline Vehicles - Urban Roads
031	Light Duty Truck Gasoline Vehicles - Limited Access Roads
032	Light Duty Truck Gasoline Vehicles - Rural Roads
033	Light Duty Truck Gasoline Vehicles - Suburban Roads
034	Light Duty Truck Gasoline Vehicles - Urban Roads
035	Heavy Duty Gasoline Vehicles - Limited Access Roads
036	Heavy Duty Gasoline Vehicles - Rural Roads
037	Heavy Duty Gasoline Vehicles - Suburan Roads
038	Heavy Duty Gasoline Vehicles - Urban Roads
039	Off-Highway Gasoline Vehicles
040	Heavy Duty Diesel Vehicles - Limited Access Roads

(continued)

1985 NAPAP AREA SOURCE CATEGORIES (continued)

SCC	Category Description
041	Heavy Duty Diesel Vehicles - Rural Roads
042	Heavy Duty Diesel Vehicles - Suburban Roads
043	Heavy Duty Diesel Vehicles - Urban Roads
044	Off-Highway Diesel Vehicles
045	Railroad Locomotives
046	Aircraft LTOs - Military
047	Aircraft LTOs - Civil
048	Aircraft LTOs - Commercial
049	Vessels - Coal
050	Vessels - Diesel Oil
051	Vessels - Residual Oil
052	Vessels - Gasoline
053	Solvents Purchased*
054	Gasoline Marketed
055	Unpaved Road Travel
056	Unpaved Airstrip LTOs
057	Construction
058	Miscellaneous Wind Erosion
059	Land Tilling (Cultivation)
060	Forest Wild Fires
061	Managed Burning - Prescribed
062	Agricultural Field Burning
063	Frost Control - Orchard Heaters
064	Structural Fires
071	Beef Cattle Manure Field Application
072	Dairy Cattle Manure Field Application
073	Hog and Pig Manure Field Application
074	Broiler Chicken Manure Field Application
075	Other Chicken Manure Field Application
076	Anhydrous Ammonia Fertilizer Application
077	Beef Cattle Feed Lots
078	Degreasing
079	Drycleaning
080	Graphic Arts (Printing)
081	Rubber and Plastics Manufacturing
082	Architectural Coating

(continued)

*This category is broken down into NAPAP categories 078 through 095.

1985 NAPAP AREA SOURCE CATEGORIES (continued)

SCC	Category Description
083	Auto Body Repair
084	Motor Vehicle Manufacturing
085	Paper Coating
086	Fabricated Metals
087	Machinery Manufacturing
088	Furniture Manufacturing
089	Flat Wood Products
090	Other Transportation Equipment Manufacturing
091	Electrical Equipment Manufacturing
092	Ship Building and Repairing
093	Miscellaneous Industrial Manufacturing
094	Miscellaneous Industrial Solvent Use
095	Miscellaneous Nonindustrial Solvent Use
096	Minor Utility Sources - Coal
097	Minor Utility Sources - Oil
098	Minor Utility Sources - Gas
099	Minor Point Sources
100	Publicly-Owned Treatment Works (POTWs)
101	Cutback Asphalt Paving Operation
102	Fugitive Emissions From Synthetic Organic Chemical Manufacturing
103	Bulk Terminal and Bulk Plants
104	Fugitive Emissions From Petroleum Refinery Operations
105	Process Emissions From Bakeries
106	Process Emissions From Pharmaceutical Manufacturing
107	Process Emission From Synthetic-Fibers Manufacturing
108	Crude Oil and Natural Gas Production Fields
109	Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDFs)

1985 AREA SOURCES EMISSIONS FOR THE 49 STATES BR AREA SOURCE CATEGORY (TONS)

SCC	CATEGORY DESCRIPTION	SO2	NOx	VOC
	RESIDENTIAL			
001	ANTHRACITE COAL	7,676	814	2,790
002	BITUMINOUS COAL	29,517	2116	7454
006	WOOD	11,083	81,357	2,387,264
003	DISTILLATE OIL	129,425	75,494	2,879
004	RESIDUAL OIL	526	66	2
005	NATURAL GAS	1222	249,085	13,452
	COMMERCIAL AND INSTITUTIONAL			
007	ANTHRACITE COAL	15,528	5495	16
008	BITUMINOUS COAL	24,507	6,380	223
012	WOOD	0	0	0
009	DISTILLATE OIL	86,008	52,063	675
010	RESIDUAL OIL	103,631	31,361	579
011	NATURAL GAS	532	116,669	6034
	INDUSTRIAL			
013	ANTHRACITE COAL	107	52	0
014	BITUMINOUS COAL	353,251	130,462	609
015	COKE	190	49	1
019	WOOD	17,294	278	172
016	DISTILLATE OIL	54,659	49,817	1,572
017	RESIDUAL OIL	240,633	47,456	253
018	NATURAL GAS	766	1,225,502	29,477
020	PROCESS GAS	77	86	1
	SOLID WASTE DISPOSAL			
	RESIDENTIAL			
021	--ON-SITE INCINERATION	1,380	3,039	291,650
024	--OPEN BURNING	8320	57,624	303,718
	COMMERCIAL AND INSTITUTIONAL			
022	--ON-SITE INCINERATION	4,598	6,946	8,438
025	--OPEN BURNING	11	183	1,357
	INDUSTRIAL			
023	--ON-SITE INCINERATION	328	328	2,577
026	--OPEN BURNING	61	1,399	5,823

1985 AREA SOURCES EMISSIONS FOR THE 49 STATES BR AREA SOURCE CATEGORY (TONS)

SCC	CATEGORY DESCRIPTION	SO2	NOx	VOC
	MOTOR VEHICLES			
	GASOLINE POWERED VEHICLES			
	LIGHT DUTY VEHICLES			
027	LIMITED ACCESS	108,295	1,958,895	1,833,141
028	RURAL	48,348	899,293	879,174
029	SUBURBAN	0	0	0
030	URBAN	29,481	528,017	952,453
	LIGHT DUTY TRUCKS			
031	LIMITED ACCESS	40,635	769,548	791,665
032	RURAL	19,657	385,965	414,950
033	SUBURBAN	0	0	0
034	URBAN	9,205	175,930	344,806
	HEAVY DUTY VEHICLES			
035	LIMITED ACCESS	8096	179,671	227,979
036	RURAL	3754	82,852	110,883
037	SUBURBAN	0	0	0
038	URBAN	1938	35,687	87,633
039	OFF-HIGHWAY VEHICLES	6266	155,427	502,231
	DIESEL POWERED VEHICLES			
	HIGHWAY VEHICLES - HEAVY DUTY			
040	LIMITED ACCESS	113,609	893,581	96,597
041	RURAL	65,306	458,218	55,405
042	SUBURBAN	0	0	0
043	URBAN	65,306	483,694	108,853
044	OFF-HIGHWAY DIESEL VEHICLES	85,248	1,025,830	166,777
045	RAILWAY LOCOMOTIVES	91,157	591,495	143,572
	AIRCRAFT			
046	MILITARY	4971	38,985	90,875
047	CIVIL	1028	10,770	30,323
048	COMMERCIAL	9,018	84,025	61,149
	VESSELS			
049	COAL	3,648	177	589
050	DIESEL OIL	17,221	128,535	32,139
051	RESIDUAL OIL	141,796	23,296	1,396
052	GASOLINE	3264	18,925	416,950

1985 AREA SOURCES EMISSIONS FOR THE 49 STATES BR AREA SOURCE CATEGORY (TONS)

SCC	CATEGORY DESCRIPTION	SO2	NOx	VOC
	EVAPORATIVE LOSS			
053	SOLVENTS PURCHASED	0	0	4,674,320
054	GASOLINE MARKETED	0	0	1,004,043
	FUGITIVE DUST			
055	UNPAVED ROAD TRAVEL	0	0	0
056	UNPAVED AIRSTRIP LTOS	0	0	0
057	CONSTRUCTION	0	0	0
059	LAND TILLING (CULTIVATION)	0	0	0
058	MISC WIND EROSION	0	0	0
	OTHER			
060	FOREST WILDFIRES	1205	33,642	161,845
061	MANAGED BURNING	3183	86,110	307,814
062	AGRICULTURAL FIELD BURNING	0	10,145	66,013
063	ORCHARD HEATERS	0	0	0
064	STRUCTURAL FIRES	0	5504	45,234
	ADDITIONAL			
100	POTWs	0	0	25,407
101	CUTBACK A	0	0	191,937
102	SOCMI	0	0	164,468
103	BULK TERMS	0	0	397,985
104	PETROL FUGS	0	0	762,443
105	BAKERIES	0	0	49,971
106	PHARMS.	0	0	33,616
107	SYNTHETHIC FIBERS	0	0	160,894
108	OIL/NG PROD.	0	0	184,003
109	TSDF	0	0	1,405,076
	U.S. TOTALS	1,975,585	11,207,673	16,676,573

APPENDIX E

GLOSSARY

GLOSSARY

1000 Ton Plant	A plant emitting at least 1000 tons of a given pollutant (SO2, NOx, or VOC unless specified) in a defined year (e.g., 1985). See Priority Plants.
AEDNA	Anthropogenic Emissions Data for the 1985 NAPAP Inventory.
AEERL	EPA's Air and Energy Engineering Research Laboratory.
AP-42	"Compilation of Air Pollutant Emission Factors" published by EPA. Most SCC Emission Factors are taken from this source.
Acid Deposition Precursor	A material such as SO2 or NOx which is transformed to become a component of acidic deposition.
Acid Rain	Sulfuric, nitric, organic, or other acids falling in rain.
Acidic Deposition	The transfer of acidic or acidifying materials from the atmosphere by dry and wet deposition to the earth.
Activity Level	An estimate made of activity in an area source emission category. Combined with emission factors to produce county-level emissions estimates. Examples include county fuel consumption, motor vehicle miles of travel, employment in an SIC, and population.
Anthracite Coal	Hard, lustrous coal with little VOC content and a higher energy content than other coal types.
Anthropogenic	Relating to the impact of man on the earth, i.e., man-made. Anthropogenic emissions are the complement to biogenic emissions.
Area Source	A mobile emissions source, or a point emissions source too small or too difficult to inventory individually.

GLOSSARY

Audit Trail	A computerized tracking system that maintains a list of all changes made to a State's NEDS tape once it has been submitted to OAQPS.
Biogenic	Produced by living organisms. Biogenic emissions are frequently referred to as natural emissions and are the complement to anthropogenic emissions.
Bituminous Coal	Soft, dense black coal.
CO	Carbon monoxide.
Confirmation	The process by which large emitters of SO2 or NOx (emitting at least 2500 tons in 1985) were given the opportunity to review and respond to process-level State emissions estimates prior to submittal to NEDS.
Criteria Pollutants	Materials for which National Ambient Air Quality Standards have been set to protect human health and welfare. They include particulate matter, sulfur oxides, nitrogen oxides, carbon monoxide, ozone, and lead.
DOE	U.S. Department of Energy.
DOE/EIA Form 759	A monthly power plant survey including data on generation, fuel consumption, and fuel stocks.
DOE/EIA Form 767	An annual data base providing detailed boiler-level utility data for steam plants at least 100 megawatt capacity.
DOE/FERC Form 423	A monthly survey of the fossil fuel-fired electric utility plants with more than 50 megawatt capacity covering costs and quality of delivered fuel.
Distillate Oil	Fuel grades 1 and 2 as specified by A.S.T.M.
Dry Deposition	Removal of trace gases and particles from the atmosphere through interactions with various surfaces.

GLOSSARY

EIA	The Department of Energy's Energy Information Administration.
Emission Factor	A number which descibes the amount of pollution resulting from a unit of particular activity. For example, SO2 emitted per ton of coal burned.
Eulerian	A method for modeling fluid processes which relies on a framework of fixed coordinates. These models track the activity at a specific location. RADM is a model of this type.
FREDS	Flexible Regional Emissions Data System. An emissions data handling system designed to produce an emissions inventory suitable for input to RADM. It derives gridded, speciated, and temporally resolved emissions files.
Fugitive Emissions	Air pollution deriving from human activities that do not emanate from a particular point, such as an exhaust pipe or stack. Roadway dust and VOC from refinery valves are examples.
Lignite	A low rank of coal between peat and sub-bituminous. It contains 35-40 percent water. Its energy content is relatively low.
Mass Balance	The sum of all substances entering a reaction and all those that leave it in a given time.
Mesoscale	On the order of tens of kilometers.
Mobile Source	A non-stationary emissions source, typically a vehicle.
NADB	EPA's National Air Data Branch.
NAPAP	National Acid Precipitation Assessment Program. A ten-year program set up by Congress in 1980 to study the causes and effects of acid deposition in the U.S.

GLOSSARY

NE061 Edit Checks	A computer program designed to locate coding errors, missing data, or possibly invalid data on a State NEDS tape.
NE204	A computer program which groups emissions by major descriptive source categories from NEDS.
NEDS	National Emissions Data System. A computer system maintained by EPA for the annual reporting of criteria pollutants air emission inventories by the States.
NOx	Total gaseous nitrogen oxides as equivalent weight NO2.
Natural Emissions	Emissions from sources that are not man-made, such as from forests, crops, windblown dust, and the ocean. In practice, this includes sources in which humans play a part (such as crops).
Non-criteria Pollutant	For the purposes of the inventory, this is a category which includes the four pollutants in the inventory not defined by EPA as criteria pollutants: ammonia, hydrogen chloride, hydrogen fluoride, and primary sulfate.
Nonreactive VOC	EPA recognizes 11 photochemically nonreactive VOC species: methane, ethane, methylene chloride, Freon 113, methyl chloroform, CFC-11, CFC-12, CFC-22, CFC-23, CFC-114, CFC-115.
OAQPS	EPA's Office of Air Quality Planning and Standards.
PM	Particulate matter. Matter in the form of small airborne liquid or solid particles.
PS/EIS	Point Source/Emission Inventory System. An emissions inventory system designed by EPA and used by many states to inventory sources of air pollution. EIS/PS is compatible with NEDS.

GLOSSARY

Point Source	An emissions source with a fixed, precise location in space. For the purposes of the 1985 data base, point sources were inventoried individually if at least 25 TPY were emitted (SO2, NOx, or VOC) at plants emitting at least 100 TPY (SO2, NOx, or VOC).
Priority Plant	A facility emitting at least 1000 tons SO2, NOx, or VOC in 1985.
Quality Assurance	A process designed to assess the differences between measured and true values and to assess the accuracy of the data.
Quality Control	A process designed to verify the reasonableness -- as opposed to the accuracy -- of data.
Quality Control Loop	A quality control system designed for the 1985 NAPAP emissions inventory data involving State air pollution control agencies, EPA Regional Offices, and EPA OAQPS/AEERL.
RADM	Regional Acid Deposition Model.
Reactive VOC	Any volatile organic compound not listed as an exempt species by EPA.
Rejection Messages	Output from the NEDS NE061 program identifying invalid point source data in a State submittal which must be correctd.
Residual Oil	Fuel Grades 4, 5, and 6 as specified by A.S.T.M.
SCC	Source Classification Code. An 8-digit code which defines emissions sources at the process level. There are about 3300 standard codes currently defined by EPA.
SCC Emission Factor	Emission factors for PM, SO2, NOx, VOC, and CO, compiled for each SCC based on factors available from AP-42. Used by NEDS with reported throughputs to calculate emissions where necessary.

GLOSSARY

SIC	Standard Industrial Classification. A four-digit code identifying the principle economic activity in which a facility is engaged.
SO2	Total gaseous sulfur oxide expressed as the equivalent weight SO2.
STAPPA	State and Territorial Air Pollution Program Administrators.
Smelting	Heat treatment of an ore to separate the metallic portion, with subsequent reduction.
State QC Report	A document prepared for each State air pollution control agency by EPA OAQPS/AEERL which summarized the results of the QC process on the 1985 inventory and prioritized data correction efforts. Distributed to and returned by the States.
Stationary Source	A fixed source with a defined and precise location in space (i.e., a point source).
TPY	Tons per year. This is the emissions reporting unit for the 1985 emissions inventory.
UTM	Universal Transverse Mercator System. A geographic coordinate system which divides the earth along six degree longitudinal zones.
Uncertainty	The sum of systematic and random errors associated with an estimate.
VOC	Volatile Organic Compound.
Validation	The process of checking State inventory data against the NE061 Warning Message report to document that submitted data are correct and the message does not indicate an error.

GLOSSARY

Warning Messages	Output from the NEDS NE061 program which identifies point source data not within defined, standard data ranges which may be invalid.
Year of Record	The year plant and/or point emissions and source data represent in a NEDS submittal.